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Computer Science in Afghanistan:

A Situational Analysis of University Lecturers

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Declaration

This is to certify that the work contained within has been composed by me and is entirely my own work. No part of this thesis has been submitted for any other degree or professional qualification.

Eva Maria Hoffmann

Abstract

This thesis provides a detailed analysis of the development of computer science as an academic discipline in Afghanistan. Over the last few years, computer science, which has received much attention within the higher education system, has changed as a discipline. Academics have argued over what computer science is, what role it plays, and what it contributes to the development of the higher education system and the economy of the country.

Although the discipline of computer science is well-established internationally, in Afghanistan it is relatively new. Its development in the US and other countries has been shown to be the result of robust social processes. This thesis builds on these illuminating studies to understand and examine the developments and processes of computer science in government universities in Afghanistan. To achieve this insight and analysis, this thesis takes the particular environment into account to analyse the interrelations between the local higher education system, international networks, private sector and non-governmental organisations.

Following the work of Adele Clarke, the establishment of computer science is examined from a social worlds perspective, with her situational analysis as a conceptual and methodological approach. It focuses on the perspectives of the lecturers - they are the ones who teach in the universities and define what computer science is through their statements and practices. However, their actions are influenced by the complex environment in which they are embedded. Therefore, this study presents a broader interpretation of the higher education system by indicating that computer science is highly recognised and is heavily supported by international involvement. At the same time, the institutionalisation of the discipline is mostly based on local networks and relationships.

The lecturers define what a computer scientist is in Afghanistan, and how their visions and orientations are shaped by their education, experiences, and expertise. When they implement their visions and change teaching methods, they

are often limited by their socio-cultural identity as lecturers, which is much more entrenched with social structures than in Western countries. Further, the marginalisation of scientific competence and discovery impedes the flourishing of a scientific environment and hinders the establishment of a strong scientific community.

Despite a challenging security situation, the development of formal institutional processes has taken place rapidly since 2001. Computer science faculties were opened and degree programmes established. Yet, there is a tension between these institutionalisation processes, which are informed heavily by international bodies of public and private institutions, and the lecturers' capacity to create their own vision of computer science within the Afghan higher education system. Lecturers have found it necessary to mediate between technical and socio-cultural practices. Moreover, they act as translators between different social worlds. This influences how they perceive themselves, and it shapes their own identity as well as their disciplines' identity.

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List of Abbreviations

ACM	Association for Computing Machinery
AfgREN	Afghanistan's Research and Education Network
ANDS	Afghanistan National Development Strategy
BSc	Bachelor of Science
BU	Balkh University/Afghanistan
CCNA	Cisco Certified Network Associate
CS	Computer Science
CSO	Central Statistics Organization, Kabul, Afghanistan
CSS	Cascading Style Sheets
CV	Curriculum Vitae
DAAD	German Academic Exchange Service
FCO	Foreign and Commonwealth Office, the UK's Ministry of Foreign Affairs
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
HE	Higher Education
HTML	HyperText Markup Language
HU	Herat University/Afghanistan
ICF	Informatics Curriculum Framework
ICT	Information and Communication Technology
ICT4D	Information and Communication Technology for Development
IEEE	Institute of Electrical and Electronics Engineers
IFIP	International Federation for Information Processing
IIEP	International Institute for Education Planning
IIT	Indian Institutes of Technology
IT	Information Technology
ITCK	IT-Center Kabul
KEU	Kabul Education University of Rabbani/Afghanistan
KonU	Konar University/Afghanistan
KPU	Kabul Polytechnic University/Afghanistan
KU	Kabul University/Afghanistan

MCIT	Ministry of Communications and Information Technology
MIT	Massachusetts Institute of Technology
MoE	Ministry of Education
MoFA	Ministry of Foreign Affairs/Afghanistan
MoHE	Ministry of Higher Education
MSc	Master of Science
NGO	non-governmental organisation
NHESP	National Higher Education Strategy Plan
NU	Nangarhar University/Afghanistan
OECD	Organisation for Economic Co-operation and Development
PC	Personal Computer
Ph.D.	Doctor of Philosophy
QU	Qandahar University/Afghanistan
STS	Science Technology Studies
SZU	Sheikh Zayed University Khost/Afghanistan
TFBSO	Taskforce for Business and Stability Operations of the US Department of Defense
TU Berlin	Technical University of Berlin
TVET	Technical and Vocational Education and Training
UK	United Kingdom
UN	United Nations
UNCSTD	United Nations' Commission on Science and Technology for Development
UNESCO	United Nations Educational, Scientific and Cultural Organization
US	United States of America
USSR	Union of Soviet Socialist Republics
ZiiK	Center for international and intercultural Communication/TU Berlin

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1 Introduction

'We achieved many goals: A modern IT center, PC labs, a campus network, and a Computer Science Faculty with a special and demand-oriented curriculum on an international level. There are now 18 lecturers, eight of whom are female and 11 of whom are Master graduates from TU Berlin. There are 460 students enrolled, 111 of which are female. Our graduates are finding job positions in this area, and some of them founded their own IT companies. This has all been developed from the [sic] scratch'.

(Invitation Letter for the 10-year anniversary of the Computer Science Faculty, Herat, June 2014)

In June 2014, Herat University celebrated the ten-year anniversary of its computer science faculty. International and national guests arrived to celebrate its successful establishment together with the leadership of the university, as well as their lecturers and students. The governor of Herat Province, representatives of the Ministry of Higher Education (MoHE), representatives of the German Embassy, a representative of the German Foreign Office (by video), representatives of the German Academic Exchange Service (DAAD), the project director of the Afghanistan project at the Technical University of Berlin (TU Berlin), the computer science deans of the faculties in Balkh, Nangarhar and Qandahar, all came together to congratulate and honour the university's efforts.

The guest list reveals the international and national importance of this event. It shows that the establishment of computer science is not only an achievement for the higher education system in Afghanistan but for the development of the country in general. Amidst the reconstruction process, the establishment of a computer science faculty with PC labs and trained lecturers is an achievement that carries much symbolic meaning.

The recent history of Afghanistan is characterised by political uncertainty, conflicts, violence and infringement of human rights under the Taliban regime and is connected to a general image of stagnation or a state of underdevelopment. Meanwhile, modern technology, and in particular modern information and

communication technologies (ICTs), are symbols of modernity and agents of change. Thus, computer science receives much attention within national as well as international agendas as a route to 'development'.

The ten-year celebration at the computer science faculty at Herat University sends a significant message. It is a celebration to demonstrate that within the last ten years, a vibrant computer science faculty has been established from scratch. In 2004, there were no buildings, classrooms, materials, computers or Internet: not even lecturers, just students. Today, students from 2004 are faculty lecturers who manage and run the faculty on their own. During the ceremony, the speakers reflected on the challenging initial situation and the continuous progress over the years. The ceremony was a tribute and acknowledgement to all involved. It illustrates that a large number of actors have contributed to the realisation of the new faculty; it was, and still is, a joint effort. Its continued success is only possible through the political engagement and will of individuals in politics, within the universities and at donor agencies as well as through the personal and professional contributions of lecturers and students.

The computer science faculty in Herat has particular significance because it was the first faculty in the country. The establishment of the computer science faculty, based on a long-term academic partnership between TU Berlin and Herat University, is facilitated mainly through international development cooperation between Afghanistan and Germany. The computer science faculty was a pioneering project and lead the way for the development of other such faculties within Afghanistan, including at Balkh and Qandahar Universities. Through the establishment of the computer science faculty, the discipline can gain ground in the higher education system. Master's and Ph.D. programmes, in particular at the TU Berlin, have ensured that the faculties can hire qualified lecturers.

The computer science faculty in Herat also plays a special role for me, personally. It was my first contact with the country itself. In May 2005, I arrived in Herat as part of a team with six other lecturers from TU Berlin. Together with the students, we refurbished the rooms, we cleaned, we set up the systems; we worked together day and night. The interest and the engagement of the students have remained my motivation in supporting this project for the past ten years. I

remember the beginnings, when students struggled with the mathematical and logical nature of computer science. At that time, the market demanded practical hands-on skills such as the establishing of networks and the administration of PCs. Today, students talk about opening their own IT companies, developing software or model information systems. Further, computer science takes an important place in the higher education system. However, the understanding of what computer science is and what computer scientists do has changed over the years, and my interest lies in how and why it changed.

The computer science faculty in Herat was my initial experience of Afghanistan, but over the years I have had the chance to work with lecturers and students from other computer science faculties and with staff in the MoHE. Through my work, I communicated with government officials, donors, university leadership, other lecturers and students, and I became aware of how many different individuals, groups and institutions are involved in the establishment of computer science and in the reconstruction process of the higher education system in general. The communal efforts revealed the complexity of the situation, as different agendas, visions and perspectives collided in talks about how computer science should be. I became aware of the social nature of disciplines as well as the social and technical complexities of knowledge and technology transfer. In order to gain a theoretical understanding of my observations and experiences, I became interested in studying these issues from a science studies perspective.

The goal of science studies is to explicate the social factors that are involved in the construction of scientific knowledge. Thus, this thesis investigates the socially constructed nature of the computer science discipline in the higher education system in Afghanistan. Seeing science as a social activity and cultural practice, the research environment is significant because it helps to locate and situate these activities and practices. In the following section, the setting of Afghanistan is introduced. This provides a short overview of the history of the country with a focus upon education and technology in Afghanistan. The recent developments in these areas lead to the rationale, as well as the aims and objectives, of this research. Subsequently, the research question and sub-

questions are presented. It is followed by the methodological and conceptual framework that explains how the research questions will be answered. An outline of this thesis concludes this introduction.

1.1 Afghanistan, the Research Environment

The research takes place in Afghanistan, a country that has been in the spotlight of the international community since the events of 11th September, 2001. The media often reports on Afghanistan but focuses mostly on military operations and political events. This overview provides some socio-cultural background information to the country. Along with a short political history, recent technological developments within the country are explained and the education system in Afghanistan is outlined. This information offers a wider view of the country and aims to support the understanding of the data analysis.

1.1.1 General/Historical and Political Background

Afghanistan (see Figure 1-1) links Central and South Asia and thus has a geopolitically important position. In the last centuries, Afghanistan has been the focal point of imperial political interests several times and its history is defined by war and conflicts, especially after the Russian invasion in 1979 when Afghanistan was the subject of an agent's war (Uldal and Marjan, 2006). Several



Figure 1-1: Afghanistan map (source: CIA, 2012)

external powers tried to gain control over it. Countries like the United States of America and the USSR were involved due to the Cold War, but states such as Saudi Arabia, Pakistan, India and Iran were also following up their own interests and involved themselves in one way or another (Barfield, 2010; Uldal and Marjan, 2006).

With the withdrawal of Russian troops and the collapse of the Soviet regime, Afghanistan drifted into a civil war which resulted in fragmentation of the country into diverse ethnic, tribal and political groups. Such fragmentation

and disunity made it impossible to establish a political legitimacy; hence, the Taliban could establish themselves in the country quite quickly. They established a fundamental Islamist regime and controlled Afghanistan for six years (1996-2001). During their regime, many human rights were taken away, especially women's. At the same time, they isolated the country in many ways and subsequently left the country in a desolate state after their downfall, characterised by political, economic and social instability (del Castilio, 2008).

Over the last decades, the country has been characterised by decades of conflict. Since the recent intervention after the events of 9/11, the highest priority in the peace-building process has been to unite the country, prepare for the democratisation process and encourage economic development (Suhrke, Harpviken and Strand, 2002). These objectives were adhered to in the framework of the Bonn Agreement in 2001, but critics stress that the framework was kept too simple for such an immense and complex task and for the reconstruction process to happen smoothly (del Castilio, 2008).

Afghanistan is in the middle of the reconstruction process, a process which Suhrke (2007:1292, her emphasis) stresses encompasses more than 'merely reconstruction'. The reconstruction processes are marked by 'programmes [that] reflect a vision of social progress – commonly called "liberal peace" – where post-war reconstruction is wrapped in a broader concept of development and modernisation' (Suhrke, 2007:1292). State-building within the paradigm of liberal peace is understood as a technical exercise which is based on international expertise that should guide the intervention and increase its effectiveness (Chandler, 2006:5; Goodhand and Sedra, 2013:242). During the last decade of the reconstruction process, international actors continuously reasserted their assistance, and the latest donor conference reaffirmed the international commitment towards Afghanistan, but if state-building is approached as a technical exercise, which generally implies that Western governments are asked how they can resolve problems in countries like Afghanistan, then problems and conflicts are inevitable. Chandler (2006:5) stresses that external state-building exercises holds extreme power imbalances. The complexity of the situation and the problems and challenges remain concealed and failures are seen as problems

and deficiencies of the states in intervention. Moreover, the states or global actors who intervene exercise their power but do not take accountability (Chandler, 2006:8). Literature points out the shortfalls in understanding the initial situation of the intervention in Afghanistan and that most developments took place in 'a situation of ignorance' (Barfield, 2010; 2012; Goodhand and Sedra, 2013; Schetter, 2013:9; Suhrke, 2007). 'The basic mistake of state builders was to ignore the distinction between government and governance' argues Barfield (2012:54) and he calls attention to local politics. The turn towards local politics marks the shift in the intervention approach of the international community (Schetter, 2013:8). The rhetoric of the reconstruction process shifted from liberating and helping the Afghan people to the transference of power and responsibility back to the Afghan people in the short term. Yet Goodhand and Sedra (2013:243) point out the complexity and messiness of the situation on many levels. The emphasis on 'Afghan-ownership' contradicts the establishment of parallel structures and projects of the international aid community. The massive external support of the international community creates aid dependency that produces a further weakening, rather than strengthening, in the state-building process (Chandler, 2006:15; Suhrke, 2007). Thus, building and strengthening institutions in order to reconstruct Afghan's society requires us to understand the underlying configurations of how these institutions exist and are formed (Goodhand and Sedra, 2013:243).

1.1.2 Technology in Afghanistan

In the past, Afghanistan was supported by different countries in the establishment of a communication infrastructure and technology. However, during the Taliban regime (1996–2001), any technological development was stopped and Afghanistan was isolated from the rest of the world. While the world became increasingly interconnected with the spreading of ICTs, Afghanistan did not participate in this emerging information and network society (Castells, 2004). On the contrary, technology was banned from public life; even existing infrastructures such as the telephone network had been destroyed.

One Internet provider was registered in the country, but the Taliban regime only officially connected one computer in its headquarters to the Internet. Any other access was not possible; the reason for this was the ‘fear of broadcast[ing] of obscene and immoral material, and material on the Internet that is against Islam’ (Uldal and Marjan, 2006:22).

Today, ICTs have successfully penetrated society. The Internet and in particular mobile phones are spreading in use (see Figure 1-2). More than half of the population has access to mobile phones, and many use the Internet via mobile. The Ministry of Communication and Information Technology (MCIT) reports a penetration of 83% and population coverage of over 89% (MCIT, 2015). Access to the Internet via landline or broadband is still very expensive, but prices have dropped considerably in the last two years, and an increase in broadband usage is anticipated.

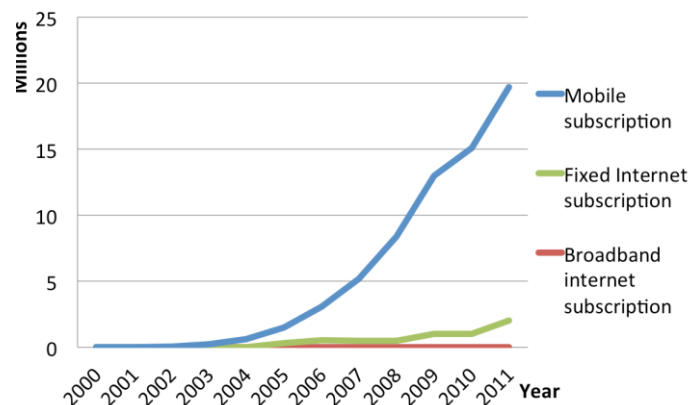


Figure 1-2: Mobile and Internet subscriptions (source: MoHE, 2012)

The MCIT is now responsible for the development of telecommunication policies and defines future priorities. The vision and mission of the MCIT are to provide strategic leadership to the ICT sector. This includes promoting the ICT sector, creating awareness inside governmental institutions and, most importantly, establishing ICT as a cross-cutting tool to support Afghanistan’s National Development Strategy (ANDS). This implies the coordination of ICT activities, the development of policies and standards, e-government services and extending the infrastructure to rural areas (MCIT, 2008).

With the rise of the ICT sector, there is a huge demand for skilled ICT expertise to implement such an expansive vision. With a main goal of stimulating

the economy with the help of ICTs, needs and potential have to be identified. While the MCIT promotes ICTs, the education system has to produce an ICT workforce. Thus, the MCIT as well as the MoHE in Afghanistan are actively engaged in the strengthening of the ICT force and have incorporated IT as a key driver in their strategic planning for nation-building and socio-economic development. Their focus is on the strengthening of computer science education as well as the setup of a sustainable IT structures (MCIT, 2003; MoHE, 2009).

1.1.3 Education in Afghanistan

Afghanistan is in the aftermath of a conflict and must rebuild its society. The education system fulfils an important role in this kind of reconstruction. Afghanistan's population is very young with a median age of 19 years. It is estimated that around 55 per cent of its 27.5 million population is below 19 years old and only 4 per cent is over 65 (CSO, 2014:4). Therefore, the education system has the potential to contribute to a prompt societal reconstruction (Davies, 2004). An efficient education system could build new capacities and establish trust within a newly emerging society (World Bank, 2003). However, if the education system is incapable of reaching the country's youth, the younger generation can become easy victims of dangerous groups and give fundamentalist movements an opportunity to gain a foothold (Peroz, 2007).

The Ministry of Education (MoE) reported an eight-fold increase in primary and secondary school enrolments from 2001 onwards (MoE, 2014). The school system still reaches only 8.7 million of the 13 million school-aged children. The MoE is responsible for primary, secondary and technical and vocational education and training, and the MoHE's remit extends from governmental to private universities. The increase in numbers of schoolchildren in primary and secondary education has had a severe impact on the MoHE, which has problems coping with high numbers of university applications. While in 2001 only 7,881 students started a higher education degree, in 2015 more than 300,000 students registered for the *konkur*, the entry exams for governmental universities, but only 55,000 students can be admitted to regular study places and another 55,000 will be enrolled in semi-higher education degrees (MoHE, 2009; CSO, 2014; Ali,

2015). According to the MoHE, the universities are unable to offer all applicants a university place and only a small percentage can enrol.

At the moment, there are 31 governmental universities throughout the country. The highest concentration is in Kabul with more than 20,000 students at Kabul University, but most provinces have a university or higher education institutes. The largest universities are Kabul, Nangarhar, Herat and Balkh Universities, while some provincial universities have fewer than 500 students (they are not included in Figure 1-3). The number of female students at governmental universities is low. The fact that women did not have access to primary and secondary schooling during the Taliban regime has certainly affected their ability to apply for university places today. Nevertheless, the number of women in tertiary education is rising, in particular in urban areas. In rural areas, the participation of women remains even more critical.

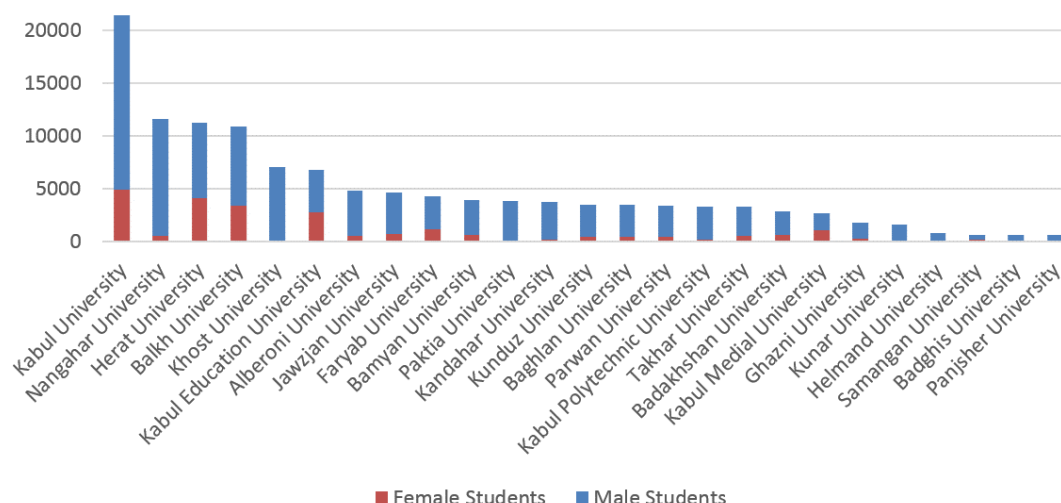


Figure 1-3: Number of students in Afghan governmental universities (source: CSO, 2014)

Recalling the history of the country, the education system is shaped by constant political change. A mixture of approaches from different countries prevails. Now, it is not only critical to restore the situation to its initial state, but new ways have to be found to overcome conflicts within society so that trust can be established. Schools and universities, in particular, can function as strong institutions that enable trust within the new emerging society. Hence, as the World Bank reports (2003:38), the strengthening of the education system builds

institutions that build 'the rules, organizations and social norms that facilitate coordination of human action'.

The MoE and MoHE stand before the complex task of establishing a modern, effective and reliable education system. Their 'vision is to facilitate the development of vibrant human capital by providing equal access to quality education for all and enable our people to participate and contribute productively to the development, economic growth and stability of [their] country' (MoHE, 2009). This vision was developed for the *National Higher Education Strategy Plan 2010-2014* (NHESP), which was produced after a larger assessment of the higher education system in 2004 (IIEP, 2004). The report of the assessments accentuated nation-building and social inclusion, but the NHESP shifted its focus onto economic growth and inclusion in the knowledge society (IIEP, 2004; MoHE, 2009).

From the foregoing, it can be seen that there are major challenges for the higher education system in Afghanistan. First, less priority is given to higher education. Most educational efforts are focused on primary or secondary education. Enshrined in the constitution of the country is the right to free education, but while the number of students increases exponentially, state funding remains almost constant and constrains the MoHE and its universities in providing quality education (McNerney, 2009). Afghan law further restricts universities in offering services or encouraging entrepreneurial fundraising activities.

Second, the lack of funding is reflected in the low salaries of lecturers, which results in them not prioritising teaching, but rather pursuing additional income. Third, the limited budget does not allow for the physical reconstruction of buildings or sufficient infrastructure. Afghanistan shares these problems with other developing or post-conflict countries. Nevertheless, Afghanistan's history and culture, the many years of war, the migration of the country's elite in the past and the immense international attention today, all locate Afghanistan in its distinct situation.

1.2 Rationale

Information and communication technologies (ICTs) have spread worldwide, in particular due to their transformational power. ICTs build the core infrastructure for today's *new economy*, however, they are not only an infrastructural tool but a technology with potential for innovation and economic development (Juma and Yee-Chong, 2005). Like many other developing countries, Afghanistan sees this necessity and the opportunity to use the potential of ICTs to modernise the country and catch up with the rest of the world (see 1.1.3).

Recent developments show that ICTs play an important role in the reconstruction process in Afghanistan. This has led to a major uptake in the ICT sector in Afghanistan in recent years, which enabled computer science as an academic discipline to become one of the most popular and desirable degree programmes in the country (CSO, 2014; MoHE, 2009). Driven by the internationalisation and globalisation of education policies, the higher education leadership and policy-makers pay much attention to computer science and ICTs.

However, the understanding of computer science as a holistic discipline has changed considerably in the past few years. Previously associated more with computer literacy skills, it is now acknowledged that computer science deals with problem-solving, design methods and their critical evaluation, and encourages communication and cooperation skills (Mahr and Peroz, 2006).

Nevertheless, the MoHE as well as academics in universities still argue about how computer science is defined, the role it plays and how it can contribute to the development of the higher education system and the economy. Thus, ongoing discussions and debates can give an insight into how a discipline like computer science gets established in Afghanistan.

1.3 Aims and Objectives

The aim of the research is to understand the development of computer science as an academic discipline in the specific Afghan situation. The introductory scenario has given a small insight into the complex environment in which computer

science appeared as a *new* discipline in the higher education landscape in Afghanistan.

Computer science is not a new developing discipline; it is an internationally recognised discipline. However, taking into account that computers were not really available in Afghanistan before 2001, establishing computer science as a discipline shares similar features.

Understanding and examining the developments and processes of computer science in Afghanistan requires taking the particular environment into account and explicating the interrelations between the local higher education system, international networks, private sector and non-governmental organisations. For reasons that will be explained, this research focuses on computer science lecturers. They are the ones who teach in the universities and define what computer science is in Afghanistan. At the same time, they are situated in the complex environment mentioned above. Thus, they have to maintain multiple positions, have to interact with various people from the university, the ministry and international agencies and at the same time must struggle in their personal lives.

This project seeks to understand the broader situation where computer science developments have taken place, but with a focus on the lecturers and how they construct their discipline and translate their opinions, ideas and decisions into actions. The perspective and involvement of the lecturers is also important in further strategic planning within the MoHE. Thus, examining the processes of how computer science becomes established can and does contribute to strengthening the scientific community. This research project aims to serve two different goals: to gain a theoretical understanding of these developments as well as actively contribute to them (see 1.4 and 1.5).

1.4 Research Question

What are the dynamics of change in computer science education in Afghanistan and the role of lecturers within these processes?

To answer the larger research question, three subsidiary research questions help to examine the situation and will be elucidated further later on (see 3.2).

1. *How do computer science lecturers in Afghanistan construct/understand their discipline?*
2. *How are computer science lecturers situated in the Afghan higher education system?*
3. *How do computer science lecturers perceive and understand the role of education and science within Afghanistan?*

The research questions are targeted to gain a deeper understanding of the situation. Such understanding is needed to utilise the findings to serve the second research aim, to contribute actively to strengthen the development of the discipline. In the past, I have been involved in projects that have supported the establishment of computer science education in Afghanistan. In the scope of this research project, I examine on-going processes in computer science education. At the same time, these findings are put to use to contribute to development of the discipline. The research questions as well as the practical research goals are approached with the following methodological and conceptual framework.

1.5 Methodological and Conceptual Framework

The methodological framework is a combination of action research and situational analysis (Clarke, 2005) and uses approaches from educational research and from science and technology studies (STS). Both approaches share the purpose of building theory from experience and explanation (Clarke, 2005; Dick, 2007; Somekh, 2006). Conceptually, the research is oriented toward the concept of co-production of science. Jasanoff's (1996) concept shows how knowledge is created and moves away from technological determinism as well as pure social constructivism. By recognising that the scientific method, as well as the social context, is integral to the production of knowledge, it counters the accusation that the social context trumps any scientific method. Co-production of science explains 'how knowledge and its production shape and sustain social and

political identities and give them power and meaning' (2004:39). Moreover, the application of the co-production of science serves to see the descriptive richness, hence, to untangle how social and political order are interwoven with particular configurations of science (Jasanoff, 2004). The dynamic processes of the scientific world and the social world, in this case, computer science in Afghanistan and its dynamics in the development of the discipline, are the core interests of such a framework.

The study of disciplines focuses on spaces where knowledge is produced. Approaches that study discipline formation highlight the social character and emphasise institutionalisation of science in the form of disciplines and/or the practices that are used to produce new knowledge. Thus, they move on the 'structure-action' continuum (Cozzens and Gieryn, 1990: 10).

For example, Lenoir (1997:58) stresses that '[a]t the heart of the approach to discipline [...] is the claim that disciplines are political institutions that demarcate areas of academic territory, allocate privileges and responsibilities of expertise, and structure claims on resources'. He stresses that disciplines are cultural institutions and that science is cultural practice. While Lenoir (1997) focuses predominantly on the institutional factors, Knorr-Cetina (1999) describes disciplines as 'epistemic cultures' by focusing on the epistemic foundations on which knowledge production is based. Earlier approaches in the history of science have often distinguished between external and internal factors (see Kuhn, 1977; Merton, 1973; Shapin, 1992). This has shifted to approaches that link external and internal (Clarke, 1998; Lenoir, 1997; Shapin, 1992). Moving away from the external/internal debate, Clarke (1998:14) advocates addressing 'internalist' and 'externalist' dimensions, including theories, ideas, people, research materials, instruments, institutions, research funding and contiguous fields alike.

The research project follows Clarke's (1998; 2005) approach in using social worlds as units of analysis when studying computer science as a discipline. Social worlds stem from a symbolic interactionist framework of the Chicago School and emphasise that through collective action and interaction, social groups create their own worlds and realities. Because people give meaning

through their perspectives, the external is 'viewed as the intrinsic *structural conditions* under which the phenomenon exists and therefore central to understanding it' (Clarke, 1997:65, her emphasis). This understanding does not dichotomise what is external and internal.

Further, Lenoir (1997:51) states, 'no one creates discipline'. Social worlds can become a concept to analyse disciplines as they allow one to focus on different social groups and their interactions and negotiations in processes of discipline formation. Situational analysis puts this particular group of computer science lecturers in the centre and elaborates from their perspective the understanding of the discipline and gives an interpretation of how they establish their practices. '[P]eople are active interpreters of information who themselves inhabit multiple context of use and practice', Bowker and Star (1999:291) observe when describing how people work together. This understanding is applicable in the case of the lecturers, who are part of different social worlds. In establishing computer science, they have to create shared meanings and practices, having to negotiate their position in order to find their own, as well as the discipline's, identity.

1.6 Research Contribution

The research contributes to the academic field of STS and education studies as well as to policy and strategy design in the MoHE. The research focuses on processes and developments that take place in computer science education in Afghanistan and specifically on the actor group of computer science lecturers. As mentioned earlier, Afghanistan and in particular the MoHE and the MCIT, see computer science as a key discipline for Afghan society (MCIT, 2008; MoHE, 2009). The emphasis stems from the importance of ICT as a tool and symbol for modernity or as an agent for development. The attention lies in the application and potential of ICTs, rather than a clear vision of what this means for computer science education.

This thesis highlights the processes and developments in computer science. Thereby, it is explicated how the establishment of computer science as an academic discipline is a social process. Understanding the practices of

lecturers in teaching computer science is key. Therefore, their orientations and visions are discussed and analysed, but also a broader interpretation of the higher education system and the position of computer science within it is made.

Recent empirical research on the higher education system in Afghanistan is scarce. Some work exists on computer science or ICT education, but it is rather descriptive (Azizi, 2008; Baha and Ahmadi, 2010; Carver Jr. *et al.*, 2008; Hayward, 2011; Wentz *et al.*, 2008). This research provides a '*thick description*' (Geertz, cited in Clarke, 2005:xxiii) of developments in the computer science discipline and the people who take part. Further, this research presents an example of modernisation and reform processes in the higher education system. The contradictions and complexities that impede a smooth reconstruction and transition are explicated and underlying conditions are uncovered.

The methodological contribution of the research is the combination of situational analysis and action research; this kind of combination has rarely been conducted, and results and experiences with the methodological framework can be added to cases already conducted. The action research component (see 3.3.2 for further description) offers the possibility to conduct research and at the same time to contribute to current processes in the development of computer science. This has proven very useful and can offer new ways in which STS can contribute to on-going processes.

In terms of a real world contribution, results of the research can feed back to policy and strategy design in the MoHE to support contextualisation of computer science, as well as the role of the computer science lecturers. Findings of the research have been presented at conferences at the MoHE in 2014, but I have continuously communicated with the lecturers in official meetings, as well as in informal conversations.

The following outline (see 1.7) gives a detailed overview of the different chapters and topics.

1.7 Outline of the Thesis

Establishing computer science in Afghanistan's higher education system brings various issues together. As pointed out earlier, the aim is to build a broader

understanding of the situation with a particular focus on computer science lecturers. Before examining the developments of computer science in Afghanistan, the literature review aims to offer a theoretical basis for the data analysis.

1.7.1 Chapter 2 – Literature Review

This chapter puts computer science developments into context by focusing in its first part on a socio-historical context of computer science primarily in the US and its second part on computer science developments in developing countries. The first part brings valuable insight into disciplinary struggles, discipline formation and the establishment and maintenance of scientific communities. The second part examines literature that deals with science in development and the objectives and challenges in establishing computer science in developing countries. These two perspectives contribute to a broader understanding of how computer science came into existence and how it spread to developing countries.

The beginnings of computer science show that the computer as a technology brought scientists and professionals together. The diversity of their backgrounds manifested in discoveries and developments in technical as well as theoretical areas. These different developments present the closeness of technology and science, but further show the struggles in the emergence of a new scientific field. *What is computer science?* was the question which expressed the scientists' search for an identity. Literature on boundary construction is used to explicate the struggles and 'ideological efforts' (Gieryn, 1983:782) of how computer science marked its territory. This leads to a section on how computer science became institutionalised as an academic discipline by the establishment of departments in universities. The history of creating the departments and degree programmes are helpful in understanding how computer science in the West became their body of knowledge. Thereby, it becomes clear how conferences, associations and other activities contributed in providing platforms where scientists met and negotiated on further developments. It also shows that the orientation and vision of individuals are important in understanding these developments.

Characteristic at the time when computer science was established in the West were constant struggles over resources, the lack of scientific lecturers, faculties being opened without any planning and computer science degree programmes being set up too fast. These issues are reminiscent of the situation in Afghanistan today. However, the development context holds further issues and influences the situation as well.

The second part of the chapter highlights the role that science possesses in development cooperation. Science and technology transfer have long been identified as mechanisms that help countries to modernise and develop. Yet Smith (2009:4) stresses '[s]cience and technology have played a central historical role in development efforts, but not an unproblematic one'. The section provides an overview of the diverse functions of science, for example in nation-building, and issues around institutionalisation and internationalisation. In particular, development practice is linked to the belief that science and technology will lead to modern societies, and that through science it is possible to tackle problems on a global scale. This has often led to a rather prescriptive practice, where blueprints and models were applied to developing countries. The implementation of computer science in many developing countries is an example, where model curricula from a Western context have been exported. In implementing these foreign curricula, universities face many challenges: they lack a suitable infrastructure, qualified staff or sufficient equipment, and have limited access to libraries with up-to-date literature. Literature identifies these internal circumstances which apply to most universities in developing countries, but external conditions cannot be ignored. Social, political and cultural influences further impede smooth development and are explored.

More recently, a new area of research focused on information and communication technology for development (ICT4D) appeared. Research focuses on ICTs as a tool that serves more than infrastructural technology; moreover, the focus is on its potential for innovation and contribution to economic development. The popularity of ICT4D poses the question of whether computer science research can contribute to it. Highly favoured in development practice, computer scientists have to evaluate how to integrate a computer science

perspective in ICT4D, which seems missing right now. It is another example of how disciplinary boundaries are fought for, as ICT4D focuses on the technology rather than the scientific research, which is often prioritised in establishing computer science as an academic discipline. The section on computer science in developing countries brings a variety of literature together, which might not all be in the foreground of this research project, but even if lecturers at faculties do not refer to all these issues, they are implicitly present in the situation.

1.7.2 Chapter 3 – Methodology

The literature review reveals that the establishment of computer science in the US or in developing countries is a social process. Following from there, the research aim is to explore and understand developments in establishing computer science as an academic discipline in Afghanistan's higher education system. The methodology chapter starts with an introduction to the research environment and explains where the research originated from and how it has been carried out. The research question is stated, the subsidiary questions are discussed in more detail and the adopted approach is described.

As previously mentioned (see 1.5), the methodological framework is a combination of situational analysis and action research. The motivation to integrate the lecturers and myself actively in the research process and contribute to on-going developments were key in choosing action research. Situational analysis presented an ideal fit for the research as it has already been used in cases of discipline formation. This section shows in more detail why and how these two approaches have been merged together.

Based on the two main research goals and the chosen approaches, the actual implementation of the research was designed. The decisions of research locations, the time frame as well as which universities and lecturers have been included is stated. Further, the methods chosen are presented. Qualitative methods such as interviews, participant observations and informal conversations often bring questions of researcher bias and validity in the research process. Therefore, a section about reflexivity, validity and reliability

position the methods as well as the researcher. The chapter completes with a discussion of limitations and ethics.

1.7.3 Chapter 4 – Doing Situational Analysis

This chapter describes how the data has been analysed. Because situational analysis is a newer approach in qualitative data analysis, the process of data analysis with these tools is described in detail. Several examples show how the tools were used and how worlds and other diagrams are constructed as well as how they are used. The chapter also helps to gain a first insight into the details of the situation. It introduces the actors and the social worlds in a descriptive way.

1.7.4 Chapters 5 and 6 – Data Analysis

These two chapters contain the data analysis and interpretation of the research; they are the core of the thesis. The two chapters together present a broad interpretation from the perspective of computer science lecturers on how computer science developments proceed in the higher education system. Chapter 5 introduces the arena of computer science while Chapter 6 focuses on the construction of computer science. As previously discussed (see 1.5), the approach of situational analysis highlights that conditions of the situation, on which action is based, are key and need to be studied and analysed. Thus, the chapter presents the arena as the situation where computer science developments take place and highlights the perspective, opinions and understanding of lecturers regarding their environment. The interpretation of the higher education system, the position of computer science in society as well as in the higher education system and the role of computer science lecturers are discussed. This supports the next chapter, which describes how lecturers construct and build an understanding of what computer science is for them as well as how they transfer their vision and understanding into the classroom to the students.

1.7.4.1 Chapter 5 – The Arena of Computer Science

In order to gain a broader interpretation of the higher education system, the two subsidiary research questions, *how are computer science lecturers situated in the*

Afghan higher education system? and how do computer science lecturers perceive the role of education and science within Afghanistan? guide this chapter.

The aim of this chapter is to introduce the arena of computer science to describe the situation in which the lecturers are positioned. Their perspectives and understandings of the situation are important for interpreting the subsequent interactions and established practices. Thus, the chapter frames and situates computer science developments by first giving an interpretation of the higher education system introducing the different active worlds. Second, it highlights what it means to be a lecturer, in particular a computer science lecturer. The role of a lecturer extends to a larger sphere than in countries in the West. This different understanding challenges the lecturers when establishing their identity as well as the identity of the discipline within the higher education system.

These two sections aim to complement different perspectives by focusing on the whole arena and the different worlds with which the lecturers interact, and then on interactions inside the faculties and with other actor groups, concentrating primarily on the lecturers.

The chapter defines the boundaries between the social and scientific worlds. The first section presents the position of computer science in Afghanistan. Computer science could gain its authority through its relevance to the reconstruction process, thus basing its legitimacy mainly on its social competence. The scientific authority is often ignored or undermined as it disrupts the existing social order which is heavily based on social relationships and social networks. International development sees the importance of IT and computer science in the reconstruction process and is interested in strengthening scientific expertise through capacity building initiatives such as scholarship programmes, short-term training programmes or infrastructural donations such as buildings, PC pools or books. The transition of these projects into Afghan structures is often difficult. Here, it can be seen how influential social norms are in reproducing the social order. Success of projects is often judged by the process of its implementation rather than its outcome and impact. Communication and participation are important during the implementation process. Complying with

culturally bound practices is necessary for a smooth project implementation. In the end, the social position of individuals influences if and how a project will be integrated and accepted, demonstrating the strength and influence of internal and local politics. This becomes clearer when observing administrative processes within the higher education system. There are power struggles over territory and influence. The weak institutional framework provides a strong structure for dominant and well-networked individuals and groups, and at the same time a quite fragile structure for dominated individuals. In combination with the very hierarchical social order, immobility and stagnation of interests and processes is inevitable.

The computer science lecturers have a particular role as they appear to be good translators and negotiators in the processes between all the different actor groups. Most are highly and recently educated, they studied in foreign countries, speak English and are, in general, interested in the modernisation and reform of the higher education system in order to strengthen their discipline and their own position. They are contact persons and hold a translator position for different actor groups, which puts them at the same time in a critical space.

The social position and the social role of the lecturers is connected with the socio-cultural identity of a lecturer in Afghanistan which is based on an Islamic understanding. Lecturers fulfil a large role that goes beyond teaching. Moreover, personal lives, beliefs, character and moral integrity are as important as academic expertise. Computer science as a new discipline and the attention it draws from international actors often conflicts with this picture. International development provides resources and implements projects, and so offers many opportunities for the lecturers in which they benefit financially, academically or in many other ways. The interests of different actors are often in conflict and this makes it difficult to negotiate and position oneself strategically. It often results in jealousy and envy and positions the lecturers in the middle of conflict. Being in a young and new discipline which could facilitate a prominent position quite quickly within the higher education system, the lecturers are under constant attack from various sides. In their struggle to gain authority over their own discipline, it becomes obvious how influential are the politics in higher education.

In order to maintain structure and hierarchies, any scientific authority is questioned and attacked so that its influence is marginalised. Lecturers get roped into political struggles, which makes it more difficult to establish a strong discipline.

All this describes the arena and the situation in which the lecturers are embedded. It shows the complexity in the construction of computer science and aims to give an overview in order to introduce in the next chapter the processes and practices in the construction of computer science in the Afghan higher education system.

1.7.4.2 Chapter 6 – The Construction of Computer Science

Following the previous chapter which introduces the arena in which the discipline has developed, Chapter 6 presents the construction of computer science. The main focus is on the subsidiary research question, *how do computer science lecturers in Afghanistan construct/understand their discipline?*

The literature review (see Chapter 2) presented how computer science was established in the US and other countries, and focused on the questions of what computer science is. The problem of demarcation of science in these countries does not arise in Afghanistan. Because computer science exists already as a recognised discipline, lecturers ask and discuss what a computer scientist is in the context of Afghanistan and how they can implement their visions in their faculties.

This chapter presents the on-going construction process in the establishment of computer science. The chapter is divided into two sections: the first part asks the question of what is a computer science in Afghanistan and describes the struggles over deciding upon a definition. The second part focuses on how the lecturers transfer their ideas and vision into the classrooms. This part highlights the socio-cultural, political and academic elements that influence how the lecturers teach computer science.

The first part presents the vision and orientation of lecturers and how they construct what computer science is for them. Their picture is constructed based on their experiences, expertise, their expectations and vision. This section looks

at how lecturers establish an organised body of knowledge, how professionalisation shapes the discipline and *vice versa*, as well as how lecturers want to build a scientific community and develop the discipline further. In order to establish an organised body of knowledge, the lecturers draw upon their experience in their own education. The different levels of knowledge on either side, the lecturers as well as the students, make the challenges in the establishment of a self-organised body of knowledge explicit. At the same time, the labour market influences the image of computer science. Lecturers and students observe what job opportunities exist for graduates and what knowledge they require. Lecturers have to negotiate how to incorporate the needed skills, to keep computer science education demand-oriented, but at the same time adapt it to international standards. This is often difficult as scientific development is not encouraged and many issues are rather political (see also Chapter 5). The struggles in making a curriculum and the formalisation of an organised body of knowledge are good examples of this, showing how social and political the processes are and how it is more of an administrative process than a scientific one.

Nevertheless, the lecturers teach computer science in their faculties and transfer it to the classrooms. Educated in foreign countries, the lecturers want to distance themselves from old teaching methods and aim to transform and modernise computer science education.

Lecturers want to transform the system in order to reach what they describe as *good teaching*. *Good teaching* involves the incorporation of modern technology, new books, more practical teaching. Lecturers also point out that students should learn and understand, rather than memorise and reproduce information. The relationship between lecturers and students has to change in order to transform education. However, transformation of this relationship is often incompatible with what is seen as a *good lecturer*. The change in teaching methods, for example, has consequences for the existing social order. An emphasis on the scientific competence within the lecture threatens the dominant social competence in place now. The struggles around the practice of teaching show how the authority of the lecturers is questioned and how influential social

relationships are in maintaining social order. The fear of losing authority, which leads to a loss of reputation and social position, brings lecturers to counter any authority loss through further degrees and qualifications. Gaining the title of a Master or a Ph.D. becomes a rather a strategic decision to enhance one's social capital than that scientific curiosity spurs it. All these struggles of the practice of teaching feed back into lecturers' and the discipline's identity.

1.7.5 Chapter 7 - Conclusion

The last chapter concludes the thesis and summarises the main arguments. A synopsis of the story is given and the main findings presented. These findings are set in relation to the literature, which has already been introduced in the literature review (see Chapter 2). While the data chapters answered the subsidiary research questions, within the conclusion the overall research question is addressed. *What are the dynamics of change in computer science education in Afghanistan and the role of the lecturers within these processes?* Chapters 5 and 6 presented the broader arena and life within the faculties. The research question extends the focus and places computer science developments within the current developments of the reconstruction and international development cooperation. It focuses on the multiple roles the lecturers incorporate and reflects these on the reform and modernisation processes that are taking place.

Further, it presents reflection on the used approach of action research and situational analysis. The approach had its advantages as well as disadvantages, thus it reflects on the methods chosen and the challenges faced, as well as the limitations of the research. Thereby, personal limitations are derived from the reflections and methodological limitations are pointed out.

The thesis closes with an outlook that restates the contributions, which have been anticipated at the beginning (see also 1.6). Thereby, unanswered and further questions for future investigation are indicated. Understanding the processes in how computer science education develops opens insights that can be further utilised to investigate the role of computer science within society and its impact on innovation and technology.

This research demonstrates that the particular local context of countries plays a significant role in how a discipline such as computer science becomes established in the higher education system. Thus in the following, the literature review traces the socio-historical context in its beginnings as well as computer science in developing countries.

2 Computer Science in Context

Today, computer science is a well-established yet young discipline. Computer science advanced in a short time to a techno-science that actively transformed many areas of everyday as well as working life. Applications of computer science have fundamentally transformed social processes. Because of its relevance, this chapter aims to set computer science as an academic discipline in context, starting with its socio-historical origins as well as presenting its spread into developing countries and examining its establishment as an internationally recognised discipline.

At its beginnings, many associated computer science with programming and algorithms, stressing the mathematical and logical nature of computer science. This view has changed over time and through the constant development of technology, the understanding of computer science research has expanded. The computer is no longer stand-alone machinery; it is embedded in systems and applications are now distributed and interact with each other. The Internet in particular has enabled the change from static models to interactive systems.

Because computer science and its applications have such a transformational character, it is highly favoured in development practice (Juma and Yee-Cheong, 2005; Unwin, 2009). Information and communication technology promises people more freedom for action and raises hopes of improving the quality of life for people in developing countries (Heeks, 2010; Smith, 2009; Unwin, 2009). Science and technology have always been seen as important tools in the transformation to a modern and industrialised country. In particular, global actors stress that a nation's welfare and wealth seem to depend on economic growth achieved through techno-scientific research and innovation. Such beliefs prioritise science and technology in global as well as in local agendas. Thus, the question of how science will be embedded in a national setting is raised.

The role of science in development and its changing role in a more globalised world are significant for a fundamental analysis of the transfer of science – in this case, computer science. The transfer of computer science does

not only include technology and methodologies. It needs an incorporation of these technologies and methodologies as well an adaption to common practices within computer science education. Moreover, localisation of the discipline is required. The following draws on literature in science technology studies to explore the link between science, technology and society in a development context.

2.1 Socio-Historical Context of Computer Science

'Computer science exists because the computer scientists wanted it to' (Ensmenger, 2010:124, my emphasis). This suggests that computer science, the academic discipline of computing, developed through the motivation and engagement of individual researchers who sought a shared identity. When they spoke about computer science, they were not only shaping the understanding of computer science but they advocated establishing computer science as an independent academic discipline. For example, Forsythe¹ (1961) was one of the first scientists who emphasised the importance of the creation of degree programmes, computer science departments, journals and similar scientific activities (Knuth, 1972:722). However, not all saw the necessity of computer science as an academic discipline at the beginning; for example, Hamming² sympathised with colleagues who wanted to escape the discussions about computer science and start *doing* it (Hamming, 1968:4). Nonetheless, he also valued Forsythe's engagement to create an original discipline and make people understand that 'it does matter what people (...) think computer science is' (Hamming, 1968:4).

Observing how the pioneers and academics in the area of computer science have described the discipline shows the variety of approaches, perspectives and changes. Forsythe (1967a:3) described it as 'the art and science of representing and processing information and in particular, processing information with the logical engines called automatic digital computers'. Knuth

¹ George Forsythe, Founder of the first computer science department at Stanford University

² Richard W. Hamming, American mathematician and Turing Award Winner (1968)

(1972) emphasised the programming of the machines and the algorithm as a unit of analysis. In 1985, Denning emphasised the design aspect in computer science by defining it as a 'body of knowledge dealing with design analysis, implementation, efficiency, and application of processes that transforms information'. Later on, Wegner (1997, 2012:813) points out that the focus swayed from algorithms to interaction, for example, multi-agent systems or behaviour-based robotics.

An excessively discussed question remains: *What is computer science?* This question has arisen frequently since the 1960s and is followed in this section. At the beginning of computing, the question was even raised of whether computer science was even a science. Nowadays, computer science has found its place and has been fully accepted as a science (Denning, 2013). Nevertheless, the question of what computer science is needs to be addressed, not with the objective of finding an answer but to reevaluate views on the subject and reconsider in which directions computer science should go (Hamming, 1968; Tedre, 2006; Denning, 2013). The focus here is not on *what computer science is*, rather it is to present how this question has been approached and how the discipline has been formed and emerged. The questions of who created computer science, where, when, why and how are essential to understand the developments (Mahoney, 2002:26).

The following presents an overview of developments in the discipline, beginning with the relationship between the histories of technology and computing in the 1950s and early 1960s, to the discussion of whether computer science is a science or not in the 1960s and concludes with the creation of computer science as an academic discipline.

2.1.1 History of Technology and the History of Computing

When posing the question, '*what is computer science?*' the next question is, '*what is this science about?*' Is it a science about computers or a science about computing (Rapaport, 2005)? This shows how the history of technology (e.g. the computer) and the history of computing are relevant to developing an understanding of computer science. The mutual dependency of technology and computing is key to the establishment of computer science as an academic discipline (Ensmenger,

2010). Without the computer there is no computing, no computer science, but without the programmers and computer scientists there would not be such advances in the development of the computer. The history of technology and the history of computing have gone hand-in-hand with each other, co-producing each other (Mahoney, 1988).

MacKenzie and Wajcman (1999) examined the relationship between technology and science and portray that development and implementation are not neutral, rather both are influenced by political, economic and social factors and each other. The Second World War, for example, created an environment that pushed the development of electronic computers (Campbell-Kelly and Aspray, 1996; Mahoney, 1988). Such developments happened to a large extent in governmental scientific research facilities and universities (Aspray, 1986). Due to the political situation with the tensions after the war and the beginnings of the Cold War, no effort or expense was spared and research funding could be secured easily through military expenditure (Flamm, 1988:2). The presence of the US military had the advantage of bringing continuous research funding, top-class people, clear objectives and markets for machinery. Questions about practicality and cost could be disregarded (Tedre, 2006:207).

Similarly in the history of computing, until the 1960s, developments in computing remained mainly in the research facilities and universities led by key computer professionals were primarily concerned with military and industrial research (Mahoney, 1988). The US government and its research funding dictated the ways of computing to a large extent. This changed in the late 1950s, when the military agenda yielded to business purposes. Computing then became about producing software for business or governmental sectors.

Mahoney (1988:116) points out that the computer 'remains an amalgam of [the] technological device and mathematical concept, which retain separate identities despite their influence on one another'. This is also reflected in the literature, which either focuses on the technology or the computing. Additionally, many historians point out that most accounts of early computing are written by computer pioneers themselves (Campbell-Kelly, 2002; Mahoney, 1988). Mahoney (1988) calls this 'insider history' and argues that their accounts are

bound by their knowledge and culture and neglect a critical view on the whole situation. However, acknowledging the conditions and choices made opens up the idea of the path-dependency of technology and shows technological development as a 'garden of forking paths' (Williams and Edge, 1996:866). Campbell-Kelly (2002) reflects on the developments in the historiography of computing and states that there are three different groups of writers. In the early stages, the history was shaped by an 'internalist' account of computer pioneers, followed by what he calls 'professionals and colonizers' (Mahoney, 2002:2), who presented specific events in a wider historical context, and the last group of 'integrators and synthesisers' (Mahoney, 2002:2) who engage in observing the history of computing from multiple diverse perspectives.

2.1.2 Computer Science - Science or Non-Science?

Characteristic in the development of computer science are the constant struggles and controversies between various actors. This can be seen in the debate as to whether or not computer science is actually a science. Gieryn (1983) understood it to be a practical problem among scientists. Acknowledging that science has no essential characteristics, he stresses that scientists themselves make 'ideological efforts' to mark what is science and what is not (Gieryn, 1983:782). Science is often treated as a standalone representative to achieve truth that extends knowledge in order to achieve progress and development. Thus, to monopolise, expand and protect science is an important endeavour in establishing authority and influence (Palmer, 2001:10). This is realised through strategic practical action, what Gieryn (1983) calls 'boundary work'. Such practical action can be the 'acquisition of intellectual authority and career opportunities; denial of these resources to "pseudoscientists"; and protection of the autonomy of scientific research from political interference' (Gieryn, 1983:781) to ensure and expand intellectual authority, the control over resources and the protection of autonomy from external influences. The concept can be variably used, focusing not only on norms between scientists themselves but also including institutions and social structures (Fisher, 1990; Sismondo, 2004).

Star and Griesemer (1989) used the concept of boundary work and extended it by emphasising boundary objects as objects that 'inhabit several intersecting social worlds'. These objects are temporally given meaning through action by the different worlds intersecting (Star, 2010). Because many in the different worlds had an interest in these objects, they were often sites of controversy or a struggle to achieve supremacy. The computer itself was such a boundary object. It facilitated collaboration and coordination between the different disciplinary worlds and at the same time started struggles within the universities.

In the beginning, when universities opened computing centres, these centres aimed to offer a neutral space for scientists. Scientists and researchers from various disciplines such as electrical engineering, mathematics, physics, logics, business management and others met motivated by their scientific curiosity and so overcame their disciplinary boundaries, boundaries that are hard-fought in academia (Ensmenger, 2010:117; Gieryn, 1983). The computing centres functioned as trading-zones, providing a secure place where scientists were able to discuss, exchange and share ideas without having to leave their institutional identity.

Before arguments as to whether computer science is a science or not arose, scientists needed to demarcate their area of interest. Extending Gieryn's (1983) theory of demarcating science and non-science, Edge (2002) and Mahoney (2002) pointed out that in the establishment of computer science, not only one boundary but several are redrawn continuously. First of all, scientists and practitioners had to construct something to make the heart of their research, by marking its first boundary around technical problems. Identifying what could be studied and how it could be studied was the first step. The technical problems and research questions, which the scientists formulated, constituted a trading zone. Previously, 'discrete scientific fields were linked by strategies of practice' (Galison, 1996:157) through the various disciplinary backgrounds of scientists which specified together common research problems and questions.

In order to explain what is considered to be a problem or question in the new emerging subfield, Mahoney (2002) described the concept of agendas.

Scientists agree on an agenda, which regulates how a consensus for a problem will be found, how problems will be prioritised, how they can be solved and what is necessary for a solution (Mahoney, 2002). It functions as a norm that scientists and practitioners commit to in order to be part of the community. The concepts of agendas are described as a well-regulated and straightforward procedure, but to become an accepted problem or an accepted body of knowledge, challenges are inevitable. Disputes over the agenda point to disagreements on which issues are critical. However, as Bourdieu (1975:19) suggests, these arguments are not so much about problems and solutions: struggles in the scientific field are always debates about scientific authority.

After demarcating which problems should be answered in the new emerging field of computer science, a boundary is drawn to distinguish between science and non-science (Edge 2002:49). As Gieryn (1983:792) states: “‘science’ is no single thing: (...) The boundaries of science are ambiguous, flexible, historically changing, contextually variable, internally inconsistent and sometimes disputed’. As there is no generally accepted view of what science is, it is difficult to argue what computer science is. In the case of computer science, the boundaries have been negotiated extensively and redrawn continuously since its birth in the 1940s.

Many deny that the increasingly used term ‘computer science’ is justifiable because of the debate concerning the nature of science. If science is about phenomena in nature, then the computer should be a natural phenomenon. However, some reject this because the computer is a created artefact. Can the nature of science be applied to computer science and are the methods of computing scientific? Newell and Simon (1976:113) defined computer science as the study of computers and the phenomena around it, stressing that the computer is a living machine. Every machine is an experiment and the way to understand it is through experimental and empirical endeavour. Later on, Simon (1984:24) elaborates further on the sciences of the artificial and includes computer science in it. By science of the artificial, Simon (1984) acknowledges that most of our environment is man-made and manipulated into purposeful artefacts like computer programs, for example. Nevertheless, this can be studied by scientists

with scientific methods, thus providing the sciences of the artificial a framework to analyse this artificial world.

However, still there are academics who reject the concept that computing is an empirical discipline and assign it to engineering. What computer science and engineering have in common is that they both deal with synthetic systems. Thus, Brooks (1996) assigns computing science to an engineering discipline. Simon (1984) confirms that a science of the artificial is very similar to the engineering discipline where the system is going to be designed, as it ought to be understood, but also highlights that artefacts are embedded in their environment and interact with it. As an additional critique, Brooks (1996) states that with the name 'computer science', it seems that theory is more appreciated than practice. Thus, others argued for a name change (McKlee, 1995) to acknowledge the non-scientific nature.

The above debates about the name of computer science indicate the difficulties in creating a new scientific research area and the challenges in institutionalising it as a discipline. Power struggles arose when computer scientists gained their own territory. As Abbott (2001:137) points out, if one gains authority over an area, others lose that authority. Thus, discussions on whether computer science is a science or not demonstrate that scientists fought for gaining authority over a territory, while others resisted granting computer science its authority.

2.1.3 Creation of an Academic Discipline

Literature on discipline formation points out the link between professionalisation and the academic discipline (Lenoir, 1997; Abbott, 2001; Becher, 1998; and see further Liles (1995) for engineering, Bechtel (1993) for cell biology, Mahoney (1988) or Ensmenger (2010) for computer science, Dunbar (2001) for geography, or Greenhalgh (1996) for population science; Kohler (1982) for biochemistry; Strick (2004) for exobiology). Thereby, these case studies point out the importance of professional associations that support the coordination of scientists in the form of informal and formal meetings. Conferences and the creation of journals take an important role in building a

knowledge base. Another significant development is the institutionalisation of a discipline within the higher education system in the form of degree programmes, departments and faculties. In the following paragraphs, literature that traces the establishment of computer science is introduced.

The above section shows that the term 'computer science' existed before the academic discipline was established. The discussions and arguments over what problems belong to computer science or whether computer science is a science or not present the disunity of science. Lenoir (1997:46) stresses that the emergence of a discipline is the consequence of such disunity. Further, he states, 'disciplines are the infrastructure of science embodied above all in university departments, professional societies, textbooks and lab manuals' (Lenoir, 1997:46). Disciplines can establish themselves as stable if they are recognised by universities and can position themselves in their landscape (Becher, 1989; Lenoir, 1997; Abbott, 2001). Thus, the creation of computer science as an academic discipline is a process inseparable from the institutionalisation of computer science within the higher education system.

Particularly in the beginning, computer-related work was seen as technician work. In order to give the profession more value and move beyond the technical occupational work, professions needed 'an organized body of knowledge' (Ensmenger, 2010:114). The creation of a specific knowledge and skill set that is transferable allows professions to gain control over a part of the labour market, along with an increase in social status or better salary. Universities' task is to adapt and incorporate these newly needed knowledge and skills sets. Due to this mutual relationship, professionalisation and discipline formation are dependent on each other. The establishment of associations, societies, journals and magazines allowed communication between scientists and practitioners in order to establish such an 'organized body of knowledge'. However, the establishment of training and degree programmes also constitute an important pillar in delivering such knowledge and skills sets and thus were welcomed not only by academics but also by the commercial sector.

2.1.3.1 Establishing Computer Science Departments

The formation of computer science as an academic discipline began when computer science departments at Purdue and Stanford Universities were founded in 1962 (Denning, 2013:36). At Stanford, Forsthye (1967b:3) advocated computer science education and saw this only happening through the establishment of computer science departments because he did 'not think computers would be well studied in an environment dominated by either mathematicians or engineers'. Students should be inspired by the new technology and its application. Within a computer science department they have better control over their faculty and, in particular, the contents of study and can promote the science in their own directions (Forsthye, 1967b).

The recruitment of staff was decisive as these scientists worked collaboratively and debated what this discipline was and what it was not, a major struggle for newly established departments (McGuffee, 2000). The status and the identity of a discipline are shaped by internal and external conditions and circumstances; the organisational structures of departments or universities and the external environment of the private sector, associations or funding resources are equally influential on the disciplinary identity as are the orientations and values of its professors and scientists.

At Stanford, as well as at Purdue, they started by offering graduate programs for both MSc and Ph.D. degrees. Graduate programmes were established first, particularly with the goal to build faculty staff through Ph.D. programmes (Atchison, 1985:326). Post-graduate training comprises the years when students are immersed in their 'discipline' by their professors. Reproducing the vision, values and scientific methodologies they have experienced ensures stability for the department as well as for the institutionalisation of the discipline itself (Becher, 1989; Ben-David, 1964; Lenoir, 1997).

At Purdue, the computer science department was established quite *ad hoc* and without sufficient lecturers, facilities, curriculum or strategy. The university leadership had foreseen the importance of computer science as a major academic discipline and saw it as a necessity to give the field space to develop (Rice and

Rosen, 2004). Providing 'an institutional niche in which a distinctive style of work is done' (Kohler, 1982) is suggested as a major element for the successful formation of a discipline (Becher, 1989; Lenoir, 1997; Liles, 1995).

By the end of the 1960s, there were around 20 computer science departments in the US. In 1967, only Columbia University, Massachusetts Institute of Technology (MIT), Purdue, Princeton and Yale University offered undergraduate and graduate programmes. While some saw the computer as a machine that could be completely understood, some foresaw that the study of computation and automation would be a field without imminent obsolescence (Denning, 1985:19).

The establishment of computer science departments was an important step, not only in regard to institutionalising scientific activity but also to gain more control over resources in order to carry out these activities (Gieryn, 1983). Hamming (1968:4), in his ACM Turing Lecture, acknowledges Forsthye's engagement in pushing for the establishment of computer science departments. He himself described how he wanted to avoid any discussion about institutionalisation as well as questions about *what computer science is* or *what it could develop into*, but realised that establishing formal institutions facilitated easier access to resources. Such access to resources is fundamentally important in sustaining the institutionalisation of computer science.

Government funding was the primary financial resource in the beginning, but without an institutional home, scientists competed for funding for computer science research against their home departments. However, scientists and researchers did not want to apply for funding via the mathematics or engineering discipline and be dependent on their judgement as to where funding was to be spent. Thus, by receiving the acknowledgement of original research and problem domains institutionalised in the computer science departments, decision makers recognised computer science as an independent area of research. This allowed it not only to be eligible to receive funding directly but to have claims to resources such as rooms, laboratories and books (Ensmenger, 2010).

2.1.3.2 Curriculum

The establishment of computer science departments was accompanied by an ongoing discussion about disciplinary identity. The professors, scientists and students shaped such identity within the department, but in the definition-finding process, communication and exchange happened beyond the department boundaries. Abbot (2001) describes patterns of divergence and convergence of concepts, methods or problems in the development of disciplines. Such processes do occur internally but also externally in platforms like societies, journals or conferences (Becher, 1989). Which concepts, methods or problems are relevant, what knowledge needs to be acquired and what knowledge qualifies one to be a computer scientist are defined in the curricula.

Further, the curriculum presents a perspective on how the discipline is seen. In the beginning, key figures wrote papers with suggested courses, literature lists and potential research areas, they gave their opinion on how many courses students should attend, how the courses should be named, what content should be taught (Atchison, 1985; Denning, 1995; Forsthye, 1967a; Forsthye, 1967b; Hamming, 1968; Newell *et al.*, 1967; Wegner, 1970). Weingart (2010:8) describes this as an important phase in the discipline formation; moreover, the essence of discipline formation is the phase when key figures communicate with each other within closed circles and the communication is self-referential.

As the first computer science departments, Purdue and Stanford principally shaped the discipline with last effects (Rise and Rosen, 2004). Their experiences and recommendations have influenced, for example, the dialogue within the Association of Computing Machinery (ACM) on computer science education.

The ACM took the role of the academic organisation that brings experts together and initiated conferences and workshops to foster the dialogue between academics interested in computer science at their universities. Sponsored by the National Science Foundation, curriculum recommendations have been compiled by diverse consultants for the ACM (Atchison, 1985:330). National Conference panels have been organised by the ACM to bring discussion about the computer science curriculum forward. For example, at a conference in 1964, some

universities presented their degree programmes in detail to present current developments in the area of capacity building (Gupta, 2007:44).

With the establishment of computer science departments and degree programmes, more experience could be gathered while at the same time the programmes converged in their content (Aspray, 2000:84). Even so, in 1968 there were still discussions about the location of computer science and the name. The content, the balance between theory and practice, was also greatly discussed and criticised (Hamming, 1968; Ensmenger, 2010:134). With all these concerns, a report was published with the recommendation of a curriculum, called Curriculum '68 (Gupta, 2007:49). Curriculum '68 provided a precise plan for an undergraduate degree, and recommendations for a Master's and Ph.D. programme.

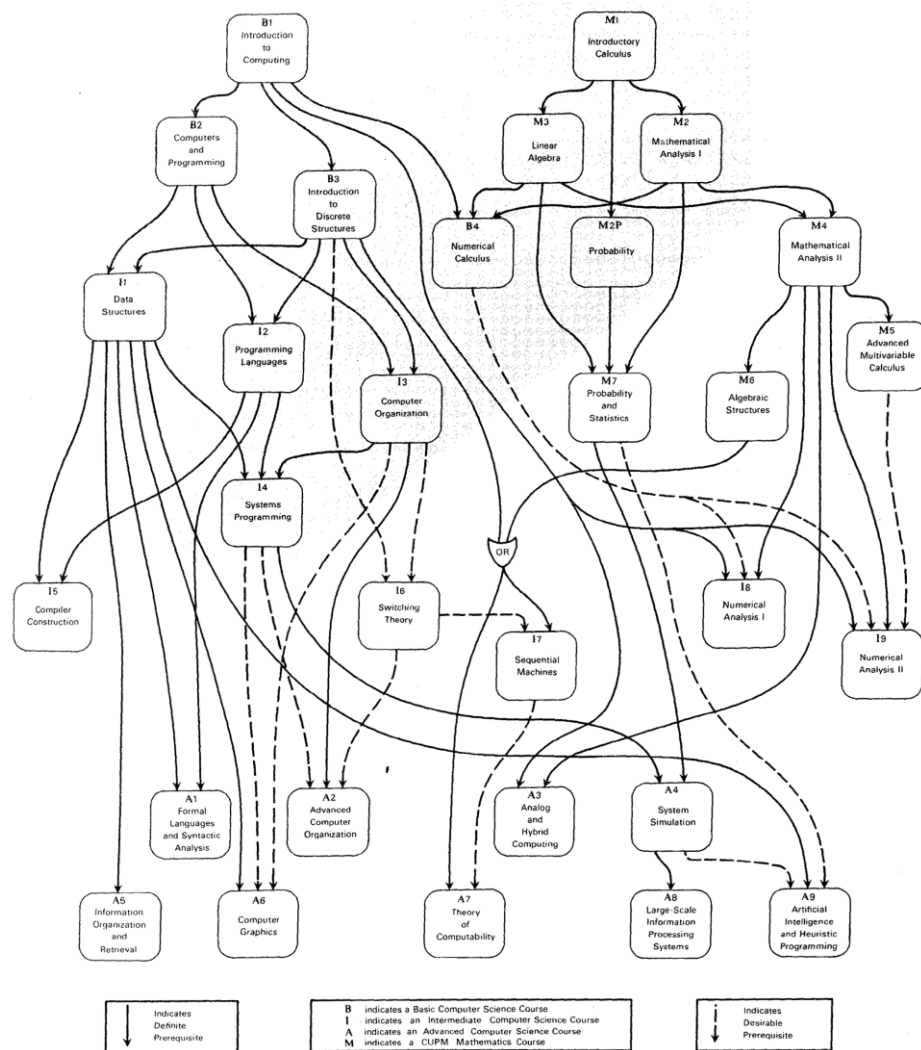


Figure 2-1: Prerequisite structure of courses (source: Atchison *et al.*, 1968)

Curriculum '68 (see Figure 2-1) constituted a milestone in discipline formation. It provided the discipline with a solid foundation for training new members, while at the same time leaving space for continuing debates about its boundaries. Since then, the ACM now updates its content continuously. In the compilation of the curriculum, it has been given attention on the *half-life* of knowledge in computer science (Atchison, 1985). The time in which half of the scientific knowledge has been changed and become obsolete is significant in particular because of the rapid developments in computer technology. Thus, curricula have to be flexible and adaptable to these changes.

Gieryn (1983) stresses that ideology guides the scientists so that they act according to their ideological beliefs and try to maintain their authority by drawing and redrawing the boundaries of what counts as science.

A very interesting example is Hamming's (1968) Turing Award Speech which shows his internal struggles with computer science. In this public speech, he gives his view on computer science and argues that computer science can be better described as computer engineering because computer science is searching for practical solutions. More practical skills should be taught on the degree programmes and less emphasis should be placed on theoretical concepts. He finds pure mathematics impractical and advises that computer science should not fall into the trap of incorporating mathematicians' research agendas in computer science degree programmes. He criticises the ACM and their taskforce of the Curriculum '68 because it incorporates too much mathematics. More focus should lie on practical skills like programming, skills that can be beneficial for the application in real-life. Only a little later in the speech, he addresses the struggles to reach scientific status for programmers and to distinguish oneself from the technician by emphasising that for 'success in the field of computer science [it] is apt to require a command of mathematics' (Hamming, 1968:7). What knowledge and which skills should be incorporated into computer science depended on the scientists' beliefs. They themselves were not computer scientists, as the discipline did not exist; they tried to gain and create a new space or domain over which they could claim authority. Hereby, they marked which knowledge domains, which scientific problems and methodologies and practices could be

integrated into computer science and which not, but most emphasised methodologies and the importance of their original discipline.

The curriculum itself was a boundary object which brought scientists together, along with other worlds such as associations like the ACM or Institute of Electrical and Electronics Engineers (IEEE), university administrators, the industry or funding bodies such as the National Science Foundation, for example. All had different perspectives about the curriculum while the main purpose was to all the same; the curriculum had different importance for different actors. For scientists, it was often a struggle about the teaching content and from which department resources could be allocated. The boundaries were yielded to allow scientists across departments to work together on a computer science programme, but soon issues arose such as where the programme would be located and which courses should be taught. Examining the curricula in the beginning, computer science programmes were a grab-bag, a mix of courses from the mathematics and the engineering departments (Ensmenger, 2010:116). As Hamming (1968) states, it has been apparent which department developed the course programmes, because the ideology of scientists shines through how the departments developed.

2.1.3.3 Scientific Community

The establishment of computer science departments was an important step in the institutionalisation of the discipline. However, such departments are more than institutional units that provide education. '[A] department is the local rock on which the power of voice is based in academia, the organized base for the capacity of academics to exercise influence within the organization to which they belong and to branch out into larger circles' (Clark, 1987:65). Academic life takes place within these organisational structures. Thus, the computer science departments provide the base to build intellectual and scientific communities, which are organised around the computer as an object of inquiry. Lenoir (1997:47) points out that 'disciplines are institutionalized formations for organizing schemes of perception, appreciation, and action, and for inculcating them as tools of cognition and communication.' He emphasises that disciplines are about the

scientists themselves, drawing on Foucault and Bourdieu in his understanding of disciplines. Further, Becher (1989:20) asserts 'it would seem, then that the attitudes, activities and cognitive styles of groups of academics representing a particular discipline are closely bound up with the characteristics and structure of knowledge domains with which such groups are professionally concerned.'

Scientific communities take an important role in discipline formation, as these communities of scientists doing computer science define what the discipline is about. The relationships between individuals, groups and social structures are decisive in the production of scientific knowledge. With the introduction of the scientific field, Bourdieu (1975; 1988) stresses that the term, scientific community, is 'irenic' compared to the actual processes. He defines the scientific field as 'the locus of competitive struggle, in which the specific issue at stake is the monopoly of scientific authority, defined inseparably as technical capacity and social power, or, to put it another way the monopoly of scientific competence, in the sense of a particular agent's socially recognised capacity to speak and act legitimately (i.e. in an authorised and authoritative way) in scientific matter' (Bourdieu, 1975:19) This could also be seen in the debate as to whether computer science is a science or not (see also 2.1.2).

It is interesting how interactions within and outside the departments take place. Abbott (2001) distinguishes between social and cultural structures of disciplines. The social structure relates to interactions with the administration, other academics or even beyond to the public. With cultural structure, Abbott (2001) stresses that each discipline has its own culture. This recalls Wenger's (2000:225) communities of practice, where scientific communities possess their own vocabulary, methods, concepts and models. Communities interact and negotiate in their world and sub-worlds, and knowledge, vocabulary, methods, concepts and models are constructed together (Wenger, 2000; Strauss, 1978). Thereby, they also interact with other outside worlds which influence the scientific communities. The next section looks at conferences and associations and their role in disciplinary identity.

Within the computer science community, there are two associations which have a leading role, the ACM and the IEEE (Institute of Electrical and Electronics

Engineers), whereby the IEEE has a broader scope and also includes electrical engineering. Already mentioned in 2.1.3.2, it is noticeable how much influence the ACM had in curricula development. The Curriculum 68' and its successors are signposts for discipline formation worldwide. The ACM itself was established in 1947, before the institutionalisation of computer science in universities took place. In their first meeting they stated, '[t]he purpose of this organization would be to advance the science, development, construction, and application of the new machinery of computing, reasoning, and their handling of information.' Over the years the ACM has shaped academic culture in computer science with many meetings and conferences that have been organised in the name of the society and thus reinforced the collaborative part of the science.

Disciplines live on an active exchange and conferences offer a platform for such exchanges. Moreover, Pham *et al.* (2011) argue that conferences constitute social structures that shape computer science knowledge. Conferences act as trading-zones, where scientists meet colleagues from other universities, colleagues from other countries, but also other non-academic researchers. Garud (2008:1084) describes conferences as a configurative field. Thereby, he states '[c]onferences (...) are holistic events designed to foster non-linear interactions at the boundaries of interaction as small worlds collide'.

Computer science at its very beginning opted for a conference model for knowledge distribution because publication times were long and the main focus in the beginning was a fast exchange of ideas (Fortnow, 2009; Meyer *et al.*, 2009). In addition, air travel started to be affordable, thus making frequent conference visits possible. Meanwhile, conferences have won the recognition journals never received (Fortnow, 2009). Meyer *et al.* (2009:32) stress even further 'prestigious conferences are a favorite tool for presenting original research – unlike disciplines where the prestige goes to journals and conferences are for raw results'. This has long-lasting consequences for computer science knowledge as well as for the computer science community.

Further, Fortnow (2009) and Vardi (2009) stress, that top scientists sit in the programme committees and set the topics and agendas; they control the review process. This reinforces the idea of how important the orientations and

visions of individuals are in the construction of computer science. Because computer science grew immensely, it was difficult to publish in core conferences. The idea that conferences are a place of 'enactment of possibilities' (Garud, 2008:1080) is in question within the computer science community (Fortnow, 2009; Meyer *et al.*, 2009; Vardi, 2009). While Pham *et al.* (2011) argues that conferences shape computer science knowledge because computer science conferences are the major way to distribute knowledge and have a superior role to journals. Fortnow (2009) states that conference papers converged to present safe papers rather than being the place for innovative interaction. As a result, more conferences are organised which led to a splitting community, rather than bringing communities together. Conferences play an important role within scientific communities and the knowledge they produce.

What becomes apparent is how social the process of the development of a discipline like computer science is. Many factors have influenced computer science in Western countries, where origins and main developments have taken place in the past. However, as is introduced in the next section, computer science spread worldwide.

2.2 Computer Science in Developing Countries

Computer science became a dominant discipline in a very short time. The rapid uptake of computer science as an academic discipline is attributed to a variety of factors (see 2.1). The applicability of computing in various fields and the close interrelation with ICTs enabled computer science to become a discipline which is in demand around the globe. The transformational character of ICTs has been recognised quickly and, in order to counter global imbalances in information and communication access, the implementation of computer science as an academic discipline in developing countries was desired by many soon after independence (TC3-IFIP, 1984). The formation of computer science departments and degree programmes began in the 1970s in many different countries such as China (1970, see Cheatham, *et al.*, (1973)), Kenya (1969, see Umerah (1991)), Nigeria (1972, Anyanwu (1978)), Sudan (1965, see Goodman and Green (1992)), Saudi Arabia (1984, see Al-Salman and Adeniyi (2000)), or Thailand (1976, see Jordan (1980)).

UNESCO and associations such as the ACM or IEEE emphasised the importance of computer science for developing countries and have supported its diffusion through policies and guidelines on how to establish computer science (TC3-IFIP, 1984).

The implementation of computer science in universities in developing countries meets many obstacles, such as insufficient infrastructure like buildings, electricity, a lack of equipment and lecturers as well as teaching materials. In retrospect, these challenges seem similar to the early beginnings of computer science in the West. First, however, developments in the West happened in a particular atmosphere with large financial support of governments during the post-war era. Second, arguments over resources were caused by the novelty of the discipline and indicated struggles over demarking territory, establishing institutional structures and positioning the discipline within the higher education system. Thereby, the creation of institutional structures supported the formation of scientific communities and scientific identities, which further allowed the scientists to persuade funding bodies to invest in the potential of computer science.

In contrast to this, developing countries were isolated and lagging behind, with a lack of qualified researchers as well as of state-of-the-art technologies (Roberts, 1975). Nevertheless, UNESCO urged the establishment of computer science by emphasising that '[n]o school should (...) wait for the ideal situation to arrive. The needs are too great' (TC3-IFIP, 1984:14). This suggests that scientific and technological developments are closely connected to the idea that they bring development and social change. This link also reveals that 'the major proportion of scientific communities in the South is governed and influenced by their national socio-economic goals' (Gaillard *et al.*, 1997:20). Scientific developments are peripheral and the spirit of research and scientists' curiosity secondary (Gaillard *et al.*, 1997). Struggles within the higher education system are shaped by competition over scarce resources. Next to infrastructure and material shortages, the lack of highly qualified researchers and lecturers additionally impedes scientific developments.

Despite the early appeals to implement computer science in developing countries, it remained centred in the West. A growing digital divide showed that development in the area of information technologies increased asymmetrically between developed and developing countries. Yet the belief that ICTs can help developing countries to leapfrog and catch up with the rest of the world never faded. Such beliefs are deeply ingrained in development practice.

Development practice has inscribed the belief that a social and economic transformation can be reached through the application of science and technology. Information technology itself became a symbol of modernity and an agent for development. In order to catch up, strengthening the IT force is achieved through the application of computer science in the higher education landscape (Juma and Yee-Cheong, 2005).

The formation of computer science faculties and the institutionalisation of the discipline in Afghanistan is not only a scientific endeavour. It is further linked to a broader argument of institution-building as well as contributing to national socio-economic goals within the ANDS (MoEc, 2014). When analysing the processes in the establishment of computer science in the higher education system, the particular context in which these processes are embedded needs to be kept in mind. Thus, the following section begins with an emphasis on the role of science in development. This includes a short historical overview of the institutionalisation and internationalisation of science as well as science's role in nation-building. While these topics are not in the foreground of this research project, the processes are deeply embedded in the situation of inquiry.

Development practice is linked to the belief that science and technology will lead to modern societies (see 2.1.1). The establishment of computer science in many countries is an example of how model curricula from a Western context have been exported to developing countries. In different countries, the establishment of computer science is affected by the lack of infrastructure, qualified staff, sufficient equipment and access to up-to-date knowledge. In addition to the circumstances of their higher education systems, the influence of external conditions is presented. The section also highlights the relatively new research area of information and communication technology for development,

ICT4D. Computer science nowadays has a minor role in development practice and has yielded to a discourse of information and communication technology and its application for development. The relationship between ICT4D and computer science is elaborated below, to see how both can benefit from each other.

2.2.1 Science in Development

Science has always had a special role in measuring one's state of development. Over time, the concept of science has changed and particularly during the 19th century, the role of scientific progress and scientific knowledge has been seen as pivotal. Modern science, equated with Western science, obtained a superior role and has also been used as a legitimization for imperialistic expansion (Sismondo, 2004). Within this endeavour, it has been used as a tool to reach political and social stability (Adas, 1990). The perception that modern science is concentrated in the West and that non-Western peoples are on the periphery of scientific progress stimulated the idea to transfer science in the early years.

After the Second World War, President Truman with his Inaugural Address (1949) ushered in a new era, the development age (Rist, 2008). With the new paradigm of development/underdevelopment, the speech emphasised the connection of science and technology as a tool for development. A natural condition of underdevelopment was the lack of science and technology (Cooper, 1973:1). In order to counter such underdevelopment, more science and technology transfer was desired (Cooper, 1973:1).

Development and underdevelopment as a concept originated in the West and advanced to become the dominant model in which most believe (Rist, 2008). In particular, Rostow's manifesto informed development thinking by proposing a five-stage model from a traditional society to high mass consumption through modern technology (Rist, 2008). Nowadays, global actors like the World Bank, the International Monetary Fund and the United Nations heavily define strategies and approaches; they still hold on to the 'theory (...) that technology and economic development can generate new connections within the world, and transform "developing countries" into their modern, industrialized, developed counterparts' (Smith, 2009:12).

2.2.1.1 *Institutionalisation and Internationalisation of Science*

Rist (2008:254) elaborates how development is inscribed in Western philosophy. Its beliefs are linked with practices so strongly that even failures cannot shake off the belief that development with the focus on science and technology will lead countries into industrialised modern societies. This faith combined with optimism-informed development practice which was 'a visual language of blueprints, charts, and allegories' (Cullather, 2004:254) at the beginning. This optimism led to the conviction of tackling problems on a global scale through the institutionalisation and internationalisation of science (Smith, 2009:38). The idea existed that problems such as poverty, food security and health are universal problems and can be solved within international settings and with international agendas through science, which is seen as universal (Anderson, 1991; Chandler, 1992:2-3; King, 1984:12; Smith, 2009:50). Frequently cited is Chandler (1992:2-3) with his statement that 'problems are essentially independent of geography, and are certainly independent of political boundaries; so that these problems could effectively and efficiently be attacked in one central institute'.

The formation of institutions seemed a useful approach for organising scientific activity and strategic planning (Street, 1987:1884). These institutions also offered a platform for international scientific exchange. The premise was the more international, the better. International teams of experts were sent to developing countries. Thereby, the idea was to assemble a team of experts as desired for the given problem. It seemed that tackling global problems was rather a practical task of pooling the right expertise and providing the necessary resources, but it has now been realised that science and technology transfer is a much more complex endeavour.

Literature in science studies indicates that knowledge production is influenced on many different levels and is a very social activity (Barnes *et al.*, 1996). Seeing institutions as sole and superior providers of facts and solutions is spurious and too short-sighted. Additionally, science in developing countries was seen as 'pre-scientific', (Horton, 1967), meaning that science had not yet evolved to modern 'Western' science. By establishing effective institutions, the idea was to support the development from this 'pre-scientific state' to modern science.

However, because science is very culturally rooted and 'Western' science is a Western construct, endeavours to transfer these Western constructs often failed. The concept of developing countries, which are seen as primitive or backward, led to that particular environment often being misunderstood and underestimated, and cultural, social and political influences have been largely ignored (see also 2.2.2.2). The awareness that science is not universal and that problems are set within a local context have set back development promises. Literature in science and development explores the underlying configurations to understand the role of science in development (Adas, 1990; Basalla, 1967; Bhabha, 1966; Gaillard *et al.*, 1997; Prakash, 2000; Shrum and Yehouda, 1995; Smith, 2009) The realities of development failure have opened the doors to re-evaluate participation of local expertise and local involvement.

2.2.1.2 Science and Nation-Building

Along with the effort to build effective institutions, it is desirable that a nation's own scientists are involved in scientific activities and that these are not dominated by international expertise (Alberts, 2002 in Arunachalam, 2005) because, as Annan (2003:1485) indicates, 'unbalanced distribution of scientific activity generates serious problems not only for the scientific community in the developing countries, but for development itself'.

Basalla's (1967) model, which grasped developments long before contemporary development thinking, presents a three-stage model of how Western science spread to non-Western countries with the end goal of establishing national science. He reiterated that it is important to recognise that science exists in a local setting and the establishment of a national science has political importance. Similarly, Bhabha (1966:542) stresses that '[s]cience as organized national activity has been given an important place in the national life'. Science had taken an important role in India. India's move towards independence was shaped by an emphasis on science. Scientists were the actors who dominated nationalistic movements provoked by the claims of the West on the ownership of science (Prakash, 2000). Emancipating themselves from their coloniser, they aimed not to mimic or replicate but rather to invest heavily in their national

science system by institutionalising science laboratories and research institutions (Sismondo, 2004:197).

In Basalla's (1967) model, Western countries build the core of science development and non-Western countries, the periphery. This binary model has been criticised by many and reflects development thinking in the early years (Anderson, 2002; McLeod, 2000). The dualistic view has been heavily challenged and recently yielded approaches that shift away from the analysis of the nation-state to approaches that understand the changing globalised world, thus being more network-centred as well as action-oriented (Anderson, 2002; Long, 2001; Sismondo, 2004). Nevertheless, developing countries are still scientifically peripheral and are *dependent science*, meaning that scientific knowledge is made legitimate in the centre, and will then be transferred to the periphery (Basalla, 1967; Sismondo, 2004).

Waast and Krishna (2003:156) point out that 'the development of science symbolised the rationality of young states, which served as their legitimacy in relations with the big powers that might provide aid and vis-à-vis the composite nations they had to unify'. Developing countries aimed to modernise and adapt to Western science. An example is Leslie and Kargon's (2006) research examining the export of MIT to India and Iran. In line with the aim to export institutions with an international system of expertise, MIT has been employed as a model for excellent research and education to achieve such a goal. With the belief that the US's example of scientific and technological progress can contribute to building expertise, scientific communities and leadership throughout the world, the US State Department, the Ford Foundation, businessmen and political leaders in India and Iran started to realise the joint adventure. The case studies present the complexities of the endeavour at the end of the 1950s, which were not successful in all cases. Leslie and Kargon (2006) emphasise that the model of MIT that they wanted to export had embedded American experiences and expectations which did not match the 'political and economic realities of places with different histories, visions, and values'.

The training models of MIT neglected the existing education systems, which drew on other national education systems than the American one,

conspiracy theories about the intervention of the education system and a non-existent job market for the graduates, which lead to the following witticism: 'When a student enrolls at an IIT [Indian Institute of Technology], his spirit is said to ascend to America. After graduation, his body follows' (Leslie and Kargon, 2006:118). In the case of Iran, during the establishment, the importance was much more to integrate local culture, hence Islamic philosophy and history into the institutions and its training. Yet the students supported the Islamic revolution against the Shah, countering the modernisation approach of MIT. In conclusion, 'MIT did not so much fail to export the MIT "idea" as fail to understand the full implications exporting its brand of technical education to the developing world' (Leslie and Kargon, 2006:128).

2.2.1.3 Scientific Communities in Developing Countries

Basalla's model (1967) of centre and periphery also implies that scientists in developing countries are isolated (Dedijer, 1963). Gaillard (1991) investigates in his book, 'Scientists in the Third World', who the scientists are and what is their role. With the idea to understand how scientists can be brought out of their isolation and connect them to the international community, Gaillard observed different scientific communities and points out several obstacles that scientists in developing countries face. His research is not contemporary, but some points are interesting to examine as they come up in other case studies as well in this research. The scientists in developing countries often are not able to concentrate their whole time to their research, as generally low salaries require additional jobs. Additionally, Gaillard (1991:317) states that scientists are isolated from the centre. Access to scientific journals was difficult, but they also lacked books and other materials. Equipment was missing or had been transferred from developed countries. Thereby, often the particularity of the equipment made maintenance difficult and the repair could take a long time (see later also 2.2.2.1). The scientists themselves had often studied abroad in developed countries, but saw that their knowledge and skills were not applicable in their own institutions. They aimed to solve the same problems as their counterparts in the centre, but at the same time they realised that this would not lead necessarily to inclusion in

the international scientific community. Scientists were in a Catch-22 situation: they could solve local problems, which were not really recognised by the international community, or they could integrate into the international scientific community, which meant that they had to converge to international standards.

Krishna *et al.* (2000) explore how globalisation is changing the structure of science in developing countries. Globalisation has an immense impact on science as an institution across the whole world. Characteristic is a shift to the importance of knowledge and transformation towards a knowledge society/economy. In the new economy – the knowledge economy - the formation of human capital, production and dissemination of knowledge, the building of maintenance and knowledge-bases is a central element (OECD; 1996; Crede and Mansell, 1998; Ozga and Lingard, 2006). Emphasis is on the production of high-skilled knowledge workers through encouraging flexibility, creativity, collaboration and innovation (OECD, 1996; Ozga and Jones, 2007). Gibbons *et al.* (1994) refer to a change in knowledge production that can be more efficiently utilised. Thus, knowledge production has to be more contextualised, problem-oriented and transdisciplinary (OECD, 1996). This also means that scientific institutions and higher education systems have to respond to the newly formed requirements (Archibugi and Lundvall, 2001; Juma and Yee-Cheong, 2005; OECD, 2008).

Characteristic changes are the emphasis on building networks and partnerships between academia, industry and government (Becher, 1989; Etzkowitz, 2008). These new sectors bring a diverse set of actors, change mechanisms and processes of science production (Becher, 1989; Etzkowitz, 2008; Lingard and Ozga, 2007). Within science production, 'notions of value addition, profit, efficiency, etc. have assumed greater significance' (Krishna *et al.*, 2000:213). Scientific communities also need to incorporate these new ideological shifts. In order to produce more contextualised, problem-oriented knowledge, the question emerges of what research problems scientists in developing countries should tackle. The pursuit of basic research is questioned, as research outcomes may not bring added value or be commercialised easily. Nevertheless, basic research is necessary to build strong foundations on which scientific

communities can develop (Krishna *et al.*, 2000). Krishna *et al.* (2000:220) summarises that the professionalisation of scientific communities will be through 'Ph.D. training, oriented basic research and forging innovation links with the government and industry'. Nevertheless, an adaption to the new requirements has only been accomplished by countries who already have strong national scientific communities and educational structures (Gaillard *et al.*, 1997). This indicates what scholars such as Stiglitz (2002) or Rodrick (2007) often stress, that globalisation processes do not necessarily work to the advantage of developing countries. While globalisation processes are inevitable, many scholars emphasise the reinforcement of already unequal distributions (Altbach, 2007).

Information technologies are a core infrastructure as carriers of information and are supportive or even main drivers in globalisation processes (Archibugi and Lundvall, 2001; Held, 2004; Rizvi *et al.*, 2007). It seems logical that with the growing importance of information technologies, they have been seen as a solution for the stated problem to liberate scientists in developing countries from their isolation. The World Science Report of UNESCO in 1993 and the 1995 UN Commission on Science and Technology for Development stress the importance of ICTs (UNESCO, 1993; UNCSTD, 1995). Shrum (2005) and Duque *et al.* (2005) in particular are interested in how ICTs are affecting scientific communities. With the concept of connectivity, many initiatives in the developing world were directed to connect these scientific communities to global networks, with the goal of enabling better communication and collaboration which results in greater scientific productivity.

Shrum (2005) focused his research on how the Internet will globalise science and how this affects the structure of science. Duque *et al.* (2005) explores the question of whether collaboration can be linked to productivity and if ICTs can reduce problems during collaboration. Both studies focus on Ghana, Kenya and Kerala, choosing countries with a low (Kenya), medium (Ghana) and high development of research systems (Duque *et al.*, 2005). Shrum's (2005) data stems from the mid-1990s, yet he was surprised that scientists did not see the importance of ICTs in the same way as their counterparts in the US or Europe.

Scepticism towards new ICTs was prevalent and is explained by the lack of trust in the transfer of technologies from the West (Shrum, 2005:736). While scientists who studied abroad and encountered new ICTs felt a greater need for ICTs, scientists had no more contact with Western scientists than their colleagues who never left. This leads to the conclusion that the relationship between centre and periphery has not changed much. Moreover, the inclusion of researchers in developing countries means a restructuring of knowledge production processes of the whole system.

Duque *et al.* (2005) give a detailed description of the educational background of the scientists. Findings show that Ghanaian and Kenyan scientists are more mobile and more frequently studied in developed countries, which is explained by the international assistance that is given often in the form of scholarships to the two countries. Scientists from Kerala did not study abroad so often, but could get a very good advanced education within India. The scientists from Kerala were scientifically more active than the Ghanaian and Kenyans, they were involved in more research projects and published more papers, but in terms of external collaboration, the Ghanaian and Kenyan scientists were more active. Kenya, with the lowest productivity, had the highest level of external collaboration. Duque *et al.* (2005:768, his emphasis) conclude that '*collaboration is unrelated to productivity*', at least in the context of these countries. In particular, ICTs overcome problems in collaboration and help an easy facilitation of it. Scientists from Kerala had better access than the Ghanaians, and they had better than the Kenyans. There are further questions coming up from these results and answers can only be speculative. Scientists from Kerala have access to ICTs and might use it to solve research problems which makes them more productive, but they do not use it for seeking more collaboration. Meanwhile, Kenyan scientists have no access to ICTs, have more problems in their research, but use ICTs more effectively for external collaboration. What can be said is that the assumption that collaboration leads to productivity and ICTs facilitate both holds in developed countries but does not hold in developing countries.

Studying scientific communities in developing countries shows how complex and difficult it is for the scientists themselves. Institutional structures

have been created, but Gaillard (1997:152) stresses that 'scientific research has not yet been institutionalised'. Training and education and international exchange are important initiatives to support the national science system, but as Shrum (2005) indicates, scientists in developing countries remain unintegrated in the international science community. Moreover, globalisation processes have brought further difficulties to developing countries. The idea to connect scientists via information technology is a very persuasive ideal, but here Shrum (2005:743) concludes that 'connectivity according to most development agencies is empowerment, but it may be just the opposite', referring to how disparately scientists interact and use ICTs. The Internet could not change the balance of centre and periphery or processes in the production of knowledge. Moreover, analysing different scientific communities shows that every scientific community is different and acts accordingly. The history and various societal factors shape scientific communities specifically so that generalisations are not possible. A contextualisation of these communities is required.

2.2.2 Spread of Computer Science to Developing Countries

The US model has been taken as a blueprint for the development of computer science in many western European countries as well as in Japan (Atchison, 1985:339; Coy, 1997; Gruska and Vollmar, 1997). In Eastern Europe, there have been developments such as the cybernetics programme in Russia and information processing in countries like Bulgaria, Czechoslovakia, Hungary and Yugoslavia (Atchison, 1985:339).

Similar to the ACM, the International Federation for Information Processing (IFIP) had worked on a curriculum. The IFIP is a recognised UN body that evaluates the needs of universities, not only in the US and Western countries but also incorporated needs in developing countries (IFIP, 2015). The aim of the IFIP was to develop a computer science/informatics curriculum with the focus not so much on concrete contents specification (like the ACM) but rather a framework for universities to develop the foundations and leapfrog to a state-of-the-art education (Mulder and van Weert, 2001). The IFIP has given recommendations since the early 1980s; with a newer mandate from UNESCO,

the IFIP developed the Informatics Curriculum Framework, also known as ICF-2000. Mulder and van Weert (2001:77) stated a paradox, that while the demand of computer science and informatics grew, more recommendations from a variety of body arose with increasingly specialised and fragmented programs within the discipline. The IFIP's vision was to develop a framework where such developments can be placed in (Mulder and van Weert, 2001).

By observing the literature of computer science in developing countries, it can be seen that many highlight the access to technology and describe the technical feature of the machinery. Also, there are often reports about the curriculum and why specific courses are necessary and others not. Less literature focuses why computer science came to place and how it established itself within an institutional or national setting.

The implementation of computer science in a developing context brings many struggles with itself. The internal struggles within the university environment as well as the external conditions, which are different to the ones where the blueprints of computer science are coming from, the US. While it seems that internal struggles are often quite similar to the ones in the US, nonetheless, they underlie different conditions. They cannot be understood in isolation of their wider situation. In the following, these internal and external circumstances in the establishment of computer science in developing countries are described.

2.2.2.1 Internal Circumstances

The Technical Committee 3 – ICT and Education (TC3) of the IFIP in their recommendation point out difficulties in the establishment of computer science. They focus on internal situations within developing countries, such as the lack of qualified staff and sufficient equipment, access to a library with up-to-date literature and access to academic journals. Most of these needs can be fulfilled with a transfer of books, computer technology and access to scientific material (TC3-IFIP, 1984). This reflects development practice in its access-oriented way, which is still very prevalent. Many of the problems within universities in developing countries do not only concern the discipline of computer science. A lack of sufficient financial support, lack of qualified personnel, out-of-date

curricula and a huge difference between urban and rural institutions seem to be common obstacles for developing countries (Altbach, 2007; Teferra and Altbach, 2004; Teferra and Greijn, 2010; World Bank, 2002). Altbach (2007) concludes that the main challenge is to recognise the difficulties and complexities in order to be prepared and ready for changes.

Umerah (1991) reports from the establishment of a computer science institute in Kenya in 1969. Further to the problems of procurement and access to technologies and know-how, he mentions the lack of infrastructure like electricity, the high operation costs of computer technology and inadequate planning within the universities in Kenya and Nigeria.

Malaysia tried to implement computer science in 1985. Similar to the situation Umerah (1991) describes in Kenya, computers often broke and nobody could repair them. Additionally, maintenance of the computers was poor. A transfer of technology happened but was often not sustainable. Nevertheless, over the last few years, computer science has become a very popular discipline in Malaysia. The Malaysian government put a great emphasis on encouraging the youth to study computer science (Lagesen, 2007).

In a case study of the different kinds of research in computer science in Mexico in the 1980s, struggles between basic, applied and technical research were present. In the beginning, pure research was favoured because computer science itself was perceived as a technical occupation, which was revolutionary but not scientific (Lomnitz and Cházaro, 1999). Pure and theoretical research incorporated more merit within the university. Lomnitz and Cházaro (1999:127) highlight that many academics in the area of computer science left academia at the beginning of the 1980s. The internal prioritisation of basic research and the appreciation of applied research in industry outside academia made many academics leave at that time.

While at the beginning of the 1980s and 1990s computer science was highly favoured by many, the field of information technology became more popular. Disciplines around information technology target more organisational needs, are more applied and, therefore, more useful for developing countries, some argue. Tedre *et al.* (2009) worked on a contextualised IT education

programme for Tanzania because they realised that many IT projects fail and skills learned are not appropriate for the country. The generic ACM/IEEE model, which is the one mostly exported, does not fit properly to developing countries, so they aimed to create a curriculum for Tanzania that can deliver the demands of the country (Tedre *et al.*, 2009).

The literature indicates that many of the developing countries share many of the same problems as the countries chosen above (see also Egypt, Iran, Jordan, Syria (Goodman and Green, 1992); Nigeria (Umerah, 1991); Sri Lanka (Hoole, 2014); Thailand (Jordan, 1980)). However, most literature are often country reports, descriptions of the state of computer science in the universities, challenges such as the lack of scientific lectures, curricula and other resources, as well as the problems of transfer as described above. The processes that are in place, disputes about the body of knowledge and debates over what research should be pursued are only discussed in a marginal part of the literature such as in the case of Mexico (Lomnitz and Cházaro, 1999), for example.

While the above problems recall the struggles to establish computer science in the West, Umerah (1991) stresses that the trial and error developments that happened in the US are not applicable to developing countries. The emphasis on contextualisation of computer science education (see also Tedre *et al.* (2009)) points out that it needs careful analysis and a transfer of only the successful implementations. Umerah (1991) argues that developing countries should wait to see what is proved successful in developed countries, and then leapfrog, a strategy which has not been proven successful in the past. This leads to a discussion about the importance of external conditions and a deeper understanding of the whole situation.

2.2.2.2 External Conditions

External influences are important to consider when establishing a new discipline such as computer science. Parhami (1986) indicates in his case study of computer science education in Iran the particular socio-political environment when computer science was introduced to Iran. Computer science was introduced in the middle of the 'Cultural Revolution' when universities were forced to adjust

themselves to Islamic foundations. Parhami (1986) also emphasises internal circumstances such as the lack of planning, qualified personnel, technology, accreditation of the degree, teaching material and discussions about contents, as well as a lack of professionalism, as huge obstacles at that time, but he identified the change of the political landscape as the most influential force in the development of computer science in Iran. The 'Cultural Revolution' was seen as an opportunity to bring changes to the curriculum and contents of computer science education. At the same time, computer science in Iran had its biggest losses because many intellectuals left the country. During the two to three years in which universities were closing, academics dedicated their time to publishing or revision of the curriculum. Many tried to get further education outside Iran, left the country and often never returned. As computer science had its significant developments in the US and in Europe, these countries were attractive destinations for these academics. The political situation in Iran was defining for universities. 'The lesson to be learned is that in shaping of academic programs, politics is usually a stronger force than technical merit', Parhami (1986) wrote. This shows how socio-political and cultural conditions underlie the construction of science.

Goodman and Green (1992) cite Egypt as the leading computing community in the Middle East. They also present the situation in other Middle East countries such as Iran, Jordan, Syria, Tunisia and Saudi Arabia, but focus on access to technologies. Access and connectivity are not as high and they raise the question, why? A lack of funding is often not applicable, rather the political complexities in these countries where monarchies, dictatorships and theocracies are dominant. Cultural factors, such as religion, a preference for face-to-face interaction and mistrust in government are stated reasons. In their conclusion, they emphasise that technological development is linked with individual nationalisms, pointing out the external conditions and context.

Another condition that affects computer science developments is the job market available in these countries. As seen before, the professionalisation of computer scientists had enormous influence on the establishment of computer science. Yet the development of an industry underlies many other different

factors, particularly in such globalised world, and is not simple or straightforward. Heeks (1999) highlights that India could establish itself as a leader among the developing countries in the field of computer science because they pursued their software engineering dream over 30 years. Bureaucrats, industrialists and computer scientists created a vision together, a vision they pursued for a long time until it was realised.

2.2.3 Where is Computer Science in ICT4D?

The discourse of science and technology transfer altered when the World Bank (1998) broached the issue of knowledge in their yearly report in 1999. Information and communication technology took a special role, as they made it possible to gather, process and distribute information and served as the core infrastructure for these processes. As mentioned, the global construction of the information society, where computer science played a defining role, also assigns computer science a central role in developing countries. (Coy, 1992; TC3-IFIP, 1984). Yet, with the spread and availability of ICTs, the emphasis has shifted to concepts of connectivity and access towards these new technologies and has pushed computer science into the background.

The new information technologies and, in particular, the Internet brought hope for science in developing countries. Scientists in developing countries which were described as isolated from the international scientific community could now be connected through the new information technologies (Dedijer, 1963; Shrum, 2005). The new ICTs were linked in their hope that more collaboration between scientists would lead to more globalised science, but Shrum (2005:745) concludes '[s]cience is embedded in places'; this means that structural conditions have an influence and need critical examination. For example, Duque *et al.* (2005) have looked at the relationship between scientific productivity and the Internet. Their conclusion is that mechanisms and processes which worked in the developed world could not be re-established in developing countries and are sometimes even reversed (see also 2.2.1.3).

The need for computer science was expressed from early on (see 2.2.2; TC3-IFIP, 1984). Shrum (2005:735) points out that the Internet and other

communication technologies have been discussed only since 1995 in the UN Commission on Science and Technology for Development. The hope to connect scientists in developing countries with the international scientific community and thus change the social order of scientific communication cannot be fulfilled. Nevertheless, ICTs could gain a dominant role within the development practice, in which computer science is missing. Thus, the following section aims to introduce the relationship between ICT4D and computer science to understand how both can benefit from each other.

2.2.3.1 ICT4D

With the emergence of information and communication technologies and its spread to developing countries, the research of ICT4D became more acknowledged. The field of ICT4D branched out from literature about global information and knowledge society (Unwin, 2009). An optimistic belief that ICTs could provide an ideal technology for developing countries to leapfrog and catch up with the rest of the world was established from the 1990s onward (Heeks, ; Yuma and Yee-Chong, 2005; Smith, 2009; Unwin, 2009). Closing or bridging the digital divide seemed to be the solution for global problems. While nobody objects to the notion that technology can transform or change power relationships, the question of the research field, in general, is if and how ICTs can make a difference to the poorest and marginalised communities in order to transform their lives. Since the introduction of ICTs, the number of computer, Internet and mobile users has increased exponentially. Nevertheless, ICTs have intensified global asymmetries and divided the world into information-rich and information-poor (Norris, 2001; Castells, 2001; Fuchs and Horak, 2008; Unwin, 2009).

As mentioned above, development practice is still highly influenced by techno-economic models in a theoretical modernisation approach in a top-down manner (Kleine and Unwin, 2009; Heeks, 2010). In regard to ICTs, this often implies that projects try to enable material access rather than overcome social barriers (Van Dijk, 2006; Unwin, 2009; Heeks, 2010). This is reflected in the different approaches to establishing various indices to measure the digital

readiness of a country (Fuchs and Horak, 2008). Heeks (2008) states that ICT4D has moved away from such an access-oriented approach through popular approaches to bridging the digital divide with the establishment of telecentres³. Developing now into the ICT4D 2.0 paradigm, this new approach focuses more on ICT as a tool and tries to bring together computer science, information systems and development studies (Heeks, 2010). ICTs are seen as a platform-technology and do not only serve as an infrastructural technology; moreover, they have the potential for innovation and to contribute to economic development (Crede and Mansell, 1998; Juma and Yee-Cheong, 2005; World Bank, 2010).

The research area of ICT4D is rapidly growing; it is a multi-disciplinary research area that takes place in academia as well as in NGOs (Pather and Uys, 2010). Heeks (2007:1) criticises that ICT4D has ‘a bias to action, not a bias to knowledge’. He refers to the overly descriptive and non-analytical nature of ICT4D research. Brown and Grant (2010) have examined the literature about ICT and development and extended Walsham and Sahay’s (2006) categorisation into two streams of literature: literature about ICTs for development and literature about ICTs in developing countries (see Figure 2-2).

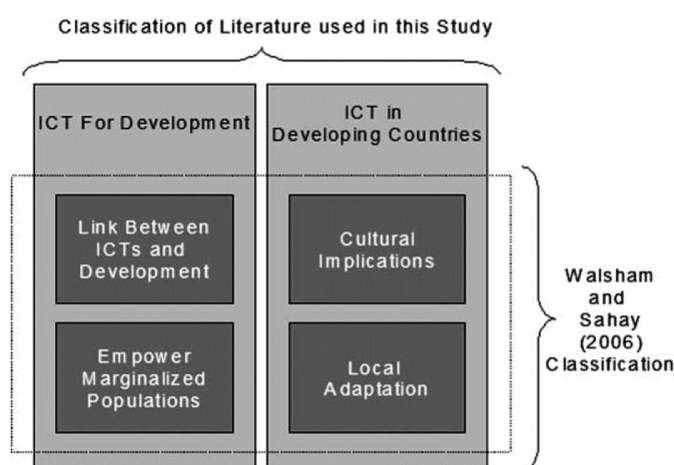


Figure 2-2: Classification of ICT and development literature (source: Brown and Grant, 2010)

The diversity of literature has stimulated Brown and Grant (2010) to investigate whether the research field of ICTs and their development lacks a

³ A telecentre is a public place where one can access and use computers and Internet.

trajectory, as many critics posit. Based on Walsham and Sahay's (2006) classification system, they categorise literature that focuses on the one hand on socio-economic development and how ICTs positively or negatively influence development and, on the other hand, literature where the development component is treated as secondary and the primary focus is to understand technology in a development context. Heeks (2007) stresses that it is important to establish an understanding about the changes and impacts that technology has on its environment. The research area of ICT4D draws on different disciplines to reach such understanding but at the same time, it is to observe that computer science as a discipline is contributing only marginally.

2.2.3.2 Computer Science for Development

The discussions of ICT4D have moved the focus entirely away from computer science, and the discipline has been marginalised in developing countries (Unwin, 2009:54). Thus, the question that Toyama and Ali (2009:40) ask is, '*can technologies for developing regions be considered a core area of computer science research?*' They recognise that computer science has no place in ICT4D, despite the need for computer scientists in this field, as there are repeated challenges that can be interesting for a computer scientist. By indicating that computer science is not open to including ICT4D research as one of its core areas, computer science excludes itself from these research areas. Acceptance within the computer science community is missing, as merit is given to the outcome and the solutions rather than to the technology itself. Furthermore, the interdisciplinary nature of the field is viewed suspiciously, Toyama and Ali (2009) state. The struggles in computer science itself to make the discipline scientific hinder the opening of boundaries to non-'pure' research. As mentioned before, maintaining a technical core seems fundamental, so computer science is not opening itself for ICT4D. As a third point, they indicate the lack of definition and generic methods that further complicate the relationship between computer science and ICT4D.

Sutinen and Tedre (2010) point out that a computer science perspective is mostly missing and present a categorisation of ICT4D research in order to pin down why this is so (see Table 2-1).

	ICT: Existing	ICT: Not Existing
Development challenge: Not known	1) Matching a tool and a problem	3) Exploratory research
Development challenge: Known	2) Evaluation research	4) Constructive research

Table 2-1: Division of research approaches in ICT4D (Source: Sutinen and Tedre, 2010)

Stating that the research area is very diverse and multi-disciplinary, they try to distinguish between the approaches where the development challenge is well-known or not known, and whether ICT solutions exist or not. The following is a summary of Table 2-1:

- 1) **Matching a tool and a problem:** An ICT tool exists and a problem will be searched and identified that the existing technology can then solve.
- 2) **Evaluation research:** The problem is well-known. Thus, an evaluation of different ICT tools will help to find an appropriate existing technology.
- 3) **Exploratory research:** This kind of research tries to open up new problem spaces and leads to research in categories 1 and 2. With a search of tools and problems, this kind of research can then produce ideas for further work.
- 4) **Constructive research:** For an existing well-known problem, a solution is searched for, and an appropriate technology does not exist. This kind of research can lead to computer science oriented research.

The above categorisation by Sutinen and Tedre (2010) gives an overview of the different kinds of ICT4D research areas. They argue that only constructive research is a category that can be relevant for computer science, as computer science understands itself as a discipline where solutions are developed for an existing problem rather than adapting technology to a local context. The main contribution of a computer scientist perspective in ICT4D is to develop functional technology (Sutinen and Tedre, 2010). Sutinen and Tedre (2010:226) state that, '[a] functional artefact needs to promote both access and ownership. Access

refers to values such as usefulness and usability; whereas ownership is based on contextual, cultural and individual priorities'. Therefore, they propose two paths for a functional ICT design (see Figure 2-3). One approach proposed is to generalise first and then personalise, while the other says to concretise and then re-contextualise.

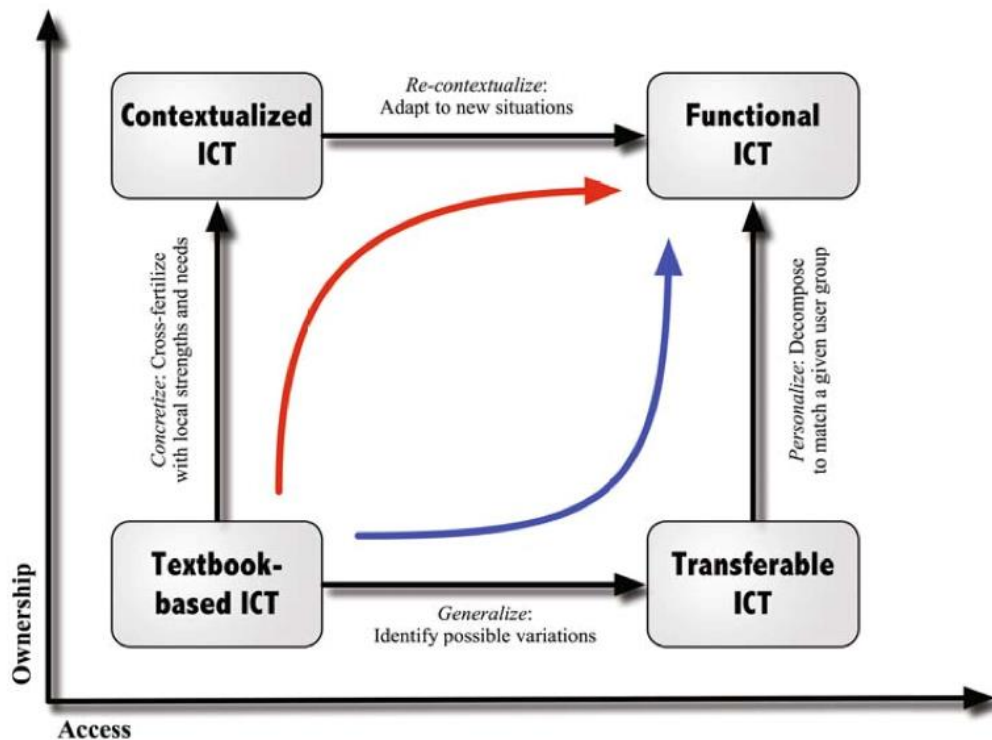


Figure 2-3: Two alternative paths towards a functional ICT artefact (source: Sutinen and Tedre, 2010)

Computer science takes an important role in the strategy to make ICTs useful for development. While ICT4D has reached more popularity, it remains a field on which more foreign experts in foreign countries work and later transfer it. The contextualisation of information technology requires local expertise as well. To build such local expertise, computer science education cannot be marginalised. Both fields can benefit from each other. The integration of computer science in ICT4D can provide further solutions and can support computer science to contextualise to local surrounding.

2.3 Summary

This chapter reflects on computer science as academic discipline, a discipline whose ‘remarkable rise to dominance (...) represents one of the great success stories of academic entrepreneurship of the late twentieth century’ (Ensmenger, 2010: 115). The history reveals that computer science came to place because of a variety of reasons. The curiosity around the computer brought scientists and practitioners together, not only in the US but worldwide. The discipline evolved from a handful of enthusiasts from different disciplines to thousands of computer scientists. The beginnings show that the establishment of an academic discipline creates challenges. Different disciplines melted together into a new one, but this process was combined with struggles, disagreements about what this discipline comprised and what it did not. History also shows that computer science departments have been established in an *ad-hoc* procedure, without much planning or long-term vision. It was set up by trial and error.

The establishment of societies like the ACM has provided a platform for scientists, companies and anybody else interested in computing to contribute their ideas and vision. Their recommendations in the Curriculum ‘68 have shaped computer science worldwide.

The historical perspective on computer science shows that the establishment of computer science was an emphatically social process. So it is to be expected that it is a social process in different countries as well. Computer science did not settle into place overnight and it will not do so in developing countries. Nevertheless, with optimism and promises of a better tomorrow, development practice favours science and technology. Thus, scientists and technologists in these countries are important actors, not only in their realm but also in their actions to develop a vision for their nation. Nevertheless, the imbalance between developed and developing countries in terms of scientific production has not changed. Moreover, academic and scientific institutions have to adapt to globalisation processes which bring further constraints. ICTs which enabled globalisation processes were seen as a hope to connect scientists and free them from isolation but the balance has not yet changed.

The importance of information and communication technology and the construction of the information society gives computer science a prominent role. ICTs' transformational character fits in well with development practice and, with ICT4D, a new, even more specialised agenda is set for ICTs and their applications for development. Yet a computer science perspective is missing. Computer science has to contribute in order to develop solutions with ICTs that are contextual and culturally implementable. The establishment of localised computer science might be an important step to using the power of information technologies.

In this respect, this research examines processes and developments in the establishment of computer science education in the higher education system in Afghanistan. The literature review addresses key issues to consider when creating this discourse about computer science in Afghanistan. These issues form the basis for this research. The data chapters point out the challenges and struggles in the institutionalisation of computer science. It is demonstrated how computer science becomes established and examines the interactions between international and local actors in their undertaking of establishing a discipline that meets socio-economic as well as scientific requirements. Before presenting the data chapters, the methodology chapter (Chapter 3) introduces the research questions in detail as well as the methodological and conceptual framework that has been chosen to conduct the research.

3 Methodology

The aim of the research is to gain an insight into the development of the computer science discipline in Afghanistan's higher education system and to gain an understanding of the establishment of an Afghan computer science field in collaboration with computer science lecturers at governmental universities. As seen in the literature review, the formation of the computer science discipline in other countries has been influenced by many different factors and the implementation of computer science in Afghanistan is quite particular.

The purpose of this research is of an exploratory, descriptive and explanatory nature, in order to inform and produce 'knowledge for action' (Blaikie, 2010:49), so that the Ministry of Higher Education (MoHE) and its universities can benefit from the findings (Ritchie and Lewis, 2003:27; Blaikie, 2010:69). Blaikie (2010:70) emphasises the exploratory nature research has when the context and the topic have had little previous investigation and the primary focus is 'to explore and describe participants' understanding and interpretations of social phenomena in a way that captures their inherent nature' (Ritchie and Lewis, 2003:28). Beyond this, the research seeks to describe and deconstruct the complexity of the situation, the relationships and different opinions of actors in the higher education system, as well as their influence on the situation. Based on the results, this project seeks to develop, in cooperation with computer science lecturers, solutions for strengthening the academic discipline (Blaikie, 2010:72).

Such research is often captured through qualitative inquiry that is mostly grounded in empirical data and often favours an inductive research strategy (Blaikie, 2010; Punch, 2009; Ritchie and Lewis, 2003); however, this project uses an abductive research strategy (Blaikie, 2010:84). Blaikie (2010) states that the aim of this strategy is 'to describe and understand social life in terms of social actors' meanings and motives'. Moreover, the abductive strategy tries to gain a deeper or more developed conception by going back and forth, and combines inductive and deductive logic (Clarke, 2007:424). Choosing an abductive

research strategy defines one's research methodology and *vice versa*. This leads to methodologies that support iterative data collection and analysis.

Two approaches have been chosen to be used jointly, incorporating the abductive research strategy. First, situational analysis (Clarke, 2005) is used, which can be described as an extended grounded theory approach that produces theory from empirical data and then generates and verifies it in a flexible and iterative way; hence, it can help to generate a '*thick description*' (Geertz, cited in Clarke, 2005:xxiii). Second, action research that aims to bring social changes and improvements through actions and reflections of the participants (Scott and Usher, 2011) is used. Both approaches can be merged together (see 3.3) and can cover two different research aims: understanding how the computer science discipline establishes itself with focus on lecturers, but also the actual strengthening of the computer science discipline together with the lecturers. Both approaches focus on a particular situation where action happens, but are reflexive to the position of the researcher as well as the participants. Thus, they address the research goals of this project.

'[M]ethodology is just one form of argumentation out of several' (Michael, 2004:433). Thus, this methodology chapter describes the choices made in order to design the research, but also introduces how the research was conducted on location. All choices influence the outcome of the research, so in order to evaluate the analysis and conclusions, the whole process of developing this research is presented.

First, the research environment is introduced. Each research environment is specific in many ways: the institutional level, which refers to the specific structure of the higher education system, and the individual level, where personal interactions of members of the higher education system are central and everything is embedded in a larger social situation. A picture of computer science education in Afghanistan's higher education system is drawn, describing the higher education system with a focus on the computer science faculties. This includes a description of the campus, but also the workplace of the lecturers where their daily life is taking place, as well as my personal situation there.

Following this, the research question with its subsidiary questions presented and explained. At this point, the conceptual framework is introduced. As previously mentioned, this constitutes a combination of situational analysis and action research. The focus is the explanation of why situational analysis has been used and how situational analysis and action research have been combined, including how they can be mutually beneficial.

Finally, the actual implementation of my field work is presented; this means an explanation of the decision on how to conduct the research as well as a time frame and a list of activities and a closer description of my empirical focus: the group of lecturers. Subsequently, the methods of data gathering and its challenges are presented. The chapter closes with a discussion of the reflexivity and validity, as well as the limitations and ethics, of the research process.

The methodology chapter presents the choices made and answers how the data collection was conducted. This sets the foundation for the next chapter (see Chapter 4 – Doing Situational Analysis), where the conceptual framework of situational analysis used is described in detail. As situational analysis is a relatively new approach, so the following chapter presents how the actual application of situational analysis has been performed, how the different tools have been used and how the situation itself has been explored and discovered; this functions as an extension to this methodology chapter.

3.1 Research Environment

In order to understand the origin of the research and how it was carried out, the following is a description of the research environment.

When I tell others that my field research took place in Afghanistan, many ask questions about the research environment and whether it is not too dangerous to live there. Some are amazed that Afghanistan has universities and that people even have access to high-tech technology. The picture imparted by media outlets focuses mainly on explosions, security problems, corruption, drugs and, of course, the Taliban. Afghanistan is far from being a secure country, yet the above image is overly negative. Afghanistan has beautiful landscapes, kind and friendly people, as well as major cities with shopping malls where you can find

any product. There are many schools and universities, governmental and private, throughout the country. Many people have mobile phones and can access the Internet from them.

The aim here is to understand my own involvement as well as to draw a picture of the MoHE, its universities and the computer science faculties.

3.1.1 Researcher's Involvement

Expats in Afghanistan say that you either come to Afghanistan and you hate it and want to go home immediately or Afghanistan will attract you and you will always come back. I have worked in Afghanistan for more than ten years now, so it is perhaps obvious into which of these categories I fall. I am fascinated by the country, its people and, of course, I enjoy my work there.

My first visit to Afghanistan was in 2005. In the framework of an academic partnership between the TU Berlin and Herat University (see also Mahr and Peroz, 2006) I spent one semester in Herat teaching computer programming. Later on, I coordinated the academic partnership between the two universities, teaching for the computer science faculty in Herat where I could also closely follow the development of the higher education system. Due to the long-term involvement of the TU Berlin as well as my personal involvement, I know the research environment well, but I am also well-known in the research environment. During my time spent in Afghanistan, I met key figures in the MoHE, chancellors of universities as well as computer science lecturers, on various occasions such as workshops or conferences in Berlin or Kabul, on visits to their universities or working at projects of the TU Berlin at the Herat University, Kabul University, as well as at the MoHE itself.

By witnessing the reconstruction and modernisation processes, I realised that the establishment of academic structures within the area of IT and computer science comprises so much more than simply transferring technology or knowledge. Exploring these issues further, I started my MSc at the University of Edinburgh in science, technology and international development, switching from computer science to social science. Changing to a different perspective and area of interest led me to my MSc research into the IT situation in the higher education

system in Afghanistan and was been conducted in the IT department of the MoHE (see also Hoffmann (2011)). While developments in the area of IT are important for the modernisation of the higher education system, I have observed that the basis for the establishment of a strong computer science discipline is its capability to generate IT experts. Therefore, I concentrated my Ph.D. on computer science education. My computer science background and the expertise of my external supervisor at the TU Berlin in computer science education as well as his knowledge of Afghanistan influenced my decision to research this particular situation. At the same time, I was able to actively support developments there.

Due to the novelty of computer science in Afghanistan, there are many young lecturers. Being able to see the development of this group over recent years and to witness them taking over more responsibilities with such motivation for change were major factors that inspired me to conduct this research. However, I did not only want to understand the processes from a social science perspective, I also wanted to contribute actively. I believe that my active contribution helped to build a rapport, to gain trust and to achieve insight into the situation. There are fewer foreigners working long-term at the universities, so by teaching actively over the last few years, I earned the respect that allowed trust to develop. By teaching some subjects within the curricula, I was a lecturer like all others as well. I did not have any managerial or consultancy positions during my fieldwork, which allowed me to integrate even more effectively. The combination of research and work was, in this case, beneficial.

3.1.2 The MoHE and Its Universities

The MoHE and the universities with computer science faculties were part of the situation in my research. The MoHE is the overall institution in the area of higher education and all governmental universities belong to the MoHE. The ministry itself is located in Kabul and Kabul University is attached to it, with Kabul Polytechnic and Kabul Education University close by. Due to its close proximity, Kabul University has a very close relationship to the MoHE and many ministry officials are also professors at Kabul University.

Other larger universities within Afghanistan are Herat University, Balkh University, Nangarhar University and Kandahar University. These are located in the major provinces.

The changes within the Afghan higher education system over the period of the last 10 years are clearly visible. Reading descriptions and listening to narratives of the past, the physical destruction of the higher education system during the time of the Taliban is very often highlighted. Now, most buildings have been renovated and more buildings are under construction. Especially for larger universities, huge pieces of land have been allocated to establish new campus areas. At Herat and Balkh Universities, I witnessed the construction and movement of the computer science faculties to new campus areas. With every visit to the MoHE or to other universities, the changes and growth are apparent. In particular in the last two years, the documentation of these visible changes became important. On the walls of the MoHE or the university buildings there are photographs of inauguration ceremonies for new buildings, new laboratories with prominent guests such as the minister, the governors, chancellors, foreign political representatives, donors and aid workers. Every building seems like a hall of fame.

The higher education system is largely dependent on foreign assistance so the buildings, laboratories and most facilities are given by donors. In 2002, the ZiiK, with financial assistance from the DAAD, established an IT-Centre at Kabul University (ITCK). At the time, it was one of the most modern IT centres in the country. The emphasis of connecting Afghanistan to the global information society became an important focus, and more and more technologies from various development agencies have been transferred. Great hope is connected to these technologies and much change has taken place.

Currently, the MoHE communicates with its universities through a weekly video-conference call in order to manage their tasks more efficiently and securely, so travel can be avoided. Many universities have been connected to the Afghan National Research and Education Network (AfgREN) and have access to high-speed Internet. IT-Centres have been established, and e-learning and computer literacy courses are offered. The computer science lecturers are in the

middle of these developments as they are often the only IT experts within the higher education system. Foreign assistance does not often involve much training and capacity building. The reasons for this are various, but are not explored here. Right now, as technical and vocational education and training (TVET) has not taken effect, the responsibility in the area of information technology is given to computer science graduates and lecturers.

3.1.3 Computer Science in Afghanistan

Computer science has spread to many countries and had reached Afghanistan already in 1995. At that time, computer science had been introduced at Kabul University; computer science was an integral part of science education and a department in the science faculty. During the Taliban regime, only 30 students were enrolled in the degree and five lecturers taught the subject in a purely theoretical way due to the lack of electricity, hardware and material (Uldal and Marjan, 2006). Since that time, much has changed.

The importance of computer science and IT is stated often, thus the expectation for computer science education is high. Compared to other disciplines, computer science is a well-founded field that offers collaborations with many foreign universities and job opportunities for graduates. This is reflected in the many applicants for the computer science degree. Especially in the private universities, computer science is a field in demand, offering job opportunities for lecturers from governmental universities.

The increase in student enrolment and the popularity of the subject encourage more and more universities to establish computer science faculties. It is possible to study computer science at nine out of 31 governmental universities in Afghanistan and probably more than 4000 students are now studying computer science at governmental universities (see Table 3-1). Computer science faculties opened at Kabul University (KU), Kabul Polytechnic (KPU), Herat University (HU), Balkh University (BU), Khost University (Sheik Zayed University (SZU)), Konar University (KonU), Nangarhar University (NU) and Qandahar University (QU). In the other universities, computer science is still taught as part

of science education, like Kabul Educational University (KEU) which has a computer science department (see also Figure 3-1).

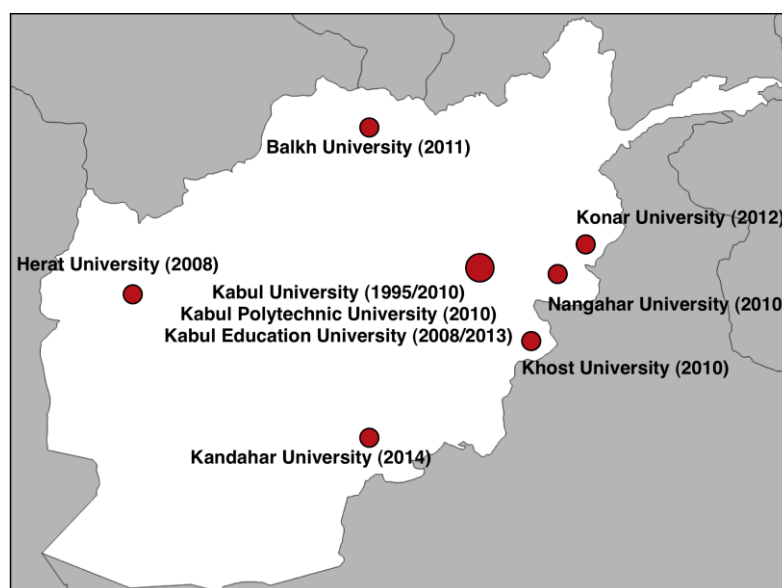


Figure 3-1: Afghanistan map with computer science faculties/departments (as at May 2014)

The MoHE has established a *tashkil* (organisational structure that regulates resource requirements, including personnel and equipment) that assigns altogether around 130-140 computer science lecturers to faculties and departments. In general, across the whole higher education system, the percentage of academic staff with a higher degree is very low: only 8 per cent have a doctoral degree and around 30 per cent a master's degree; additionally, few of them have received their degree in the last 10 years (Hayward, 2011; MoHE, 2009). Similar is the situation at the computer science faculties (see also Table 3-1).

There are several master degree programmes for newly qualified lecturers. From 2008 to 2013, 48 lecturers have been educated in a master degree programme in computer science at the TU Berlin, and 25 are studying there right now. This is the largest postgraduate programme for computer science lecturers. Aside from it, lecturers study computer science independently in the United Kingdom, United States of America, South Korea, Turkey, India and South Africa and many more countries. Until now (March 2015), no postgraduate education in computer science has been available, only at bachelor level.

Developments and changes in computer science education are also clearly visible. First, the holistic understanding of computer science has changed. I remember that, in 2005 in an official speech by MoHE officials, computer science was said to be important because it would be advantageous to have people who could write fast on the computer. At the time, computer science was equivalent to computer literacy. Students at Herat University started their studies by learning Microsoft Word, Excel and PowerPoint. While these skills are still taught because many students still face computers and notebooks for the first time when they begin their studies, they do not understand that these skills are not computer science.

In all universities that offer computer science, students and lecturers have access to computers or notebooks. In many universities, the TU Berlin has established IT-Centres that also offer PC-workstations for all members of the university like students, academic and administrative staff. Additionally, some faculties have separate PC pools for computer science students. Students are encouraged to do their homework together on the PCs.

Informal organisational structures, such as the introduction of tutorials, study groups, but also formal structures such as IT directors, responsibilities of IT staff, have been often created with the help of TU Berlin. Because Herat University has been the first computer science faculty, it has been taken as an example for faculties in Balkh, Kandahar in particular.

The number of lecturers within the faculties varies (see also Table 3-1). While Kabul University's computer science faculty has many lecturers, many applicants and a very high percentage of lecturers with an MSc degree, other universities have a lack of qualified lecturers, especially the newly opened or more remote faculties. Generally, universities have less space due to the immense increase in student numbers. They often run in different shifts. Offices of lecturers are always shared. Balkh University had no desks at first and we lecturers met in the dean's office, talking, discussing and drinking tea. There was a coming and going, as students and officials had issues to discuss. The culture to work and research in an office within their department is not very common. The number of working hours for lecturers is high and once lecturing has been done, it is highly

likely that lecturers leave the faculty to pursue their other job, as salaries are low and the salary cannot guarantee the support of their families.

University	Officially Founded	Lecturers (BSc/MSc)	Students (female)
Kabul University	1995/2008	5/25	1030 (~25%)
Kabul Polytechnic University	2008	10/13	630 (~15%)
Kabul Education University	2008	9/9	250 (~30%)
Herat University	2005/2008	7/11	460 (~25%)
Nangarhar University	2010	13/5	587 (less than 1%)
Balkh University	2011	4/2	354 (~25%)
Khost University	2010	5/6	250 (0%)
Konar University	2012	6/0	369 (0%)
Qandahar University	2014	2/3	0 (coming soon)

Table 3-1: Overview of lecturer and student numbers at computer science faculties/departments (May 2014)

3.2 Research Question

The research question evolved during the research process because more information had been gathered and priorities had shifted. Developments of computer science in Afghanistan can be seen as similar to the development of other disciplines within the Afghan higher education system. For this reason, the focus shifted to include understanding the surrounding circumstances of the higher education system in Afghanistan, rather than the particular scientific developments within the discipline. The following presents the major research question and its sub-questions.

3.2.1 Major Research Question

What are the dynamics of change in computer science education in Afghanistan and the role of the lecturers within these processes?

As mentioned previously (see 1.1), the MoHE focuses on the modernisation and reconstruction of the higher education system. It identified computer science as a key discipline and focusing on ICT for the economic development of the country and computer science as essential to this process. There is much investment from the international community in order to support

the use of ICTs in education as well as to harness ICTs for socio-economic development.

The overall research question aims to focus on newly qualified computer science lecturers as an actor group and tries to understand their social role. Tedre (2009) encourages going beyond the study of individuals and their surroundings, because systems such as the higher education system or, more particularly, a computer science faculty, are no longer designed or managed by individuals; he recommends the study of groups. Thus, the focus of this research is on a group of computer science lecturers. Clarke (2005) introduces her framework as symbolic interactionism; the focus is on how the actor group interacts with its environment. This environment comprises the MoHE and its universities as well as the international community, private sector and other actors who are involved. Their interactions in establishing computer science as a discipline are central. At the same time, the aim is to expand the environment and see how higher education fits in the social context of Afghanistan.

3.2.2 Subsidiary Questions

1. *How do computer science lecturers in Afghanistan construct/understand their discipline?*

To understand the construction and development of the discipline, the understanding of the actor group is the focus. As highlighted in the literature review, the orientations, visions and understandings are important for understanding the decisions that the actors make in order to construct their discipline. The understanding of computer science has changed dramatically in the last few years. Why is it changing, and how does the situation of the actors influence their understanding? An analytical understanding of these processes is necessary for any further developments of the discipline.

2. *How are computer science lecturers situated in the Afghan higher education system?*

The question aims to explore the power dynamics between the actor group and the remaining faculty body, as well as their position inside their

university and the MoHE. Understanding how they contribute their expertise inside their institutions can give an insight to their potential social role in the higher education system. Further, their actions and interactions with other members of the higher education system help to understand how processes in the higher education system are executed. Hence, they help to understand how the MoHE and its universities are organised.

3. *How do computer science lecturers perceive and understand the role of education and science within Afghanistan?*

The orientation and perspectives of lecturers are important in the construction of a discipline, yet external circumstances and conditions determine the lecturers' orientation and vision as well. The environment and surrounding situation are influential. The question expands to education in general, as the development of disciplines in Afghanistan is mostly linked to teaching rather than research.

Here, it should be further investigated how education and science within Afghan society are perceived and what effects it has on the development of the computer science discipline.

3.3 Situational Analysis and Action Research: A Combination

The methodological framework will be a combination of situational analysis (Clarke, 2005) and action research, thus uses one approach from science and technology studies and one from educational research. Both approaches share the purpose of building theory from experience and explanation (Clarke, 2005; Dick, 2007; Somekh, 2006).

These two approaches have been chosen because my research attempts to accomplish two different tasks. On the one hand, it aims to develop a deeper understanding of how computer science as a scientific discipline is developing within the Afghan higher education system with a particular interest in lecturers as an actor group. Seeing computer science developments influenced by social, political or cultural elements make situational analysis an optimal fit as a research methodology. As a constructivist approach, grounded in the symbolic

interactionist tradition, situational analysis emphasises the relationships between the actors and is able to concentrate on the action happening in concrete locations such as classrooms or inside the computer science faculties, between students, lecturers and administrative staff (Clarke, 2005; Cohen and Manion, 1985:36).

On the other hand, acquired knowledge was applied within the research environment, and thus altered the situation immediately. These changes are similarly interesting to observe and an important part in the information gathering. Action research is understood as 'small-scale intervention in the functioning of the real world and a close examination of the effects of such intervention' (Cohen and Manion, 1985:208), and therefore suitable for the research aim to strengthen and support the establishment of computer science actively in Afghan governmental universities. Also, my role as researcher and lecturer can be covered by this research methodology.

The following section describes the characteristics of both approaches and describes their combination.

3.3.1 Situational Analysis

Situational analysis is an approach that has been developed by Adele Clarke (2005) and stems from a constructivist critique of grounded theory. Grounded theory itself is an inductive analytic method of analysing qualitative data, introduced by Glaser and Strauss (1967). Over the years, it has been developed further and into different branches with critiques derived from it. The main idea, to generate data from 'qualitative data to elucidate the key form of action undertaken by participants in a particular situation' (Clarke and Friesen, 2007:363) remained. Grounded theory has been under attack by postmodern and poststructuralist critics because of its positivist properties. Critics stress that Strauss and Corbin (1998) take a position of post-positivism by assuming that by using their techniques to analyse the qualitative data, valid knowledge can be derived, which holds true in an objective external reality but is also inclusive towards the research subjects (Charmaz, 2003:250). Clarke (2005) utilises the advantages of grounded theory but points to the need to incorporate the new

challenges that stem from postmodernism. The situational analysis approach extends grounded theory by incorporating more reflexivity, complexity, perspective and representations of contradictions (Clarke, 2005). By pushing grounded theory around the 'postmodern' turn, Clarke (2005) emphasises the messiness of situations, searching for a methodology that is aware of the political nature of research practice that reflects on the position and perspectives of the researcher in the production of knowledge. Situational analysis exploits Foucault's work on power in relationships from different perspectives, Latour's actor network theory, as well as Strauss and Corbin's social world/arena, and can help to grasp the 'messiness' of the situation (Clarke, 2005).

Clarke's (2005) criticism of grounded theory is that it does not consider history, culture, geography or the personal attributes of the researcher and participants (Clarke, 2007:431). Hence, Clarke (2005:71, her emphasis) stresses that '*the conditions of the situation are in the situation.*' With this statement, she points out that within interactionism, where grounded theory as well as Strauss's social world/arena stem from, structures are seen as static conditional elements. These structures are not quickly changeable and rather depend on past actions and conditions. To grasp all impacts of the action pertaining to a phenomenon or the individual, Strauss and Corbin (1990, 1998) provide conditional matrixes, where structural elements surround the centre and the hierarchical structures from macro, meso and micro are prescribed within it. Clarke's (2005) tools and techniques aim to unravel these conditions and see these as part of the situation. She moves away from conditional matrices offered by Strauss and Corbin (1990) to situational maps that incorporate conditions in the situation and therefore make it part of the situation of action. The creation of the different maps and the use of the offered methodological tools of situational analysis and its analytical implications are further presented in the next chapter (see Chapter 4 - Doing Situational Analysis).

3.3.2 Action Research

Action research itself is an approach that has proven very useful in educational or organisational research. It is an approach that is known to bring change and

improvement to social practices. Its strengths and weaknesses are embedded in the dichotomy of theory and practice, academic and practitioner, subjectivity and objectivity, thus often making its legitimisation within social science research challenging (Levin and Greenwood, 2001:104; Stronach and MacLure, 1997:129). Yet it is exactly its main mission to bridge this dichotomy, to find ways to conduct research in changing situations and to foster social transformation. Such transformation is grounded in the knowledge production and understanding reached by researcher and researched together. This collaborative approach is defined by Somekh (2006:1) as the following: 'It is a methodology integrating social science inquiry with participants' practical action so that all concerned have a sense of agency rather than constructing themselves powerless'. The active integration of research subjects and their revaluation to participants within the research process is very particular. Action research is rooted in the conviction that action originates from social interactions and the capability of research participants to learn from each other, as well as that useful action can be derived from learning by doing (Somekh, 2006; Somekh and Zeichner, 2009). Hence, action research takes an important place in research environments such as schools, universities and classrooms, where interaction and cooperation is high and where practitioners' problems can be handled by the practitioners themselves (Denzin and Lincoln, 1994; Scott and Usher, 2011:41)

The outcomes of action research are highly context-dependent insights of a particular situation and demand a reflexive role for the researcher as she/he is actively involved in the research (Genat, 2009; Silverman, 1998; Somekh, 2006). To gain a collaborative understanding, the researcher is embedded in the situation within a network of interpersonal and professional relationships (Somekh, 2006:7). These relationships are constantly negotiated and the identity shaped and co-constructed in awareness of the environment in which they are embedded. Because of the constant interaction, the goals that need to be reached are shaped as well.

Action research is conducted in a cyclic way to allow constant reflection and adaption in order to reach the goals. It can be seen as a systematic intervention which is separated into four stages, as Figure 3-2 presents.

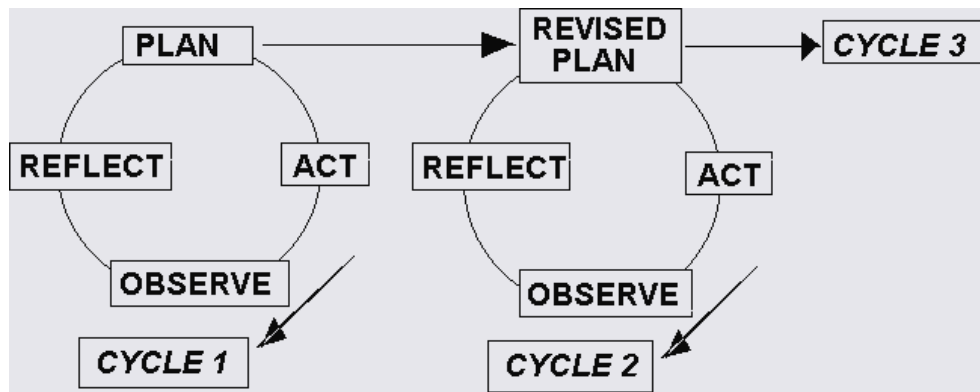


Figure 3-2: Cyclic action research approach (source: Riding *et al.*, 1995)

These different phases are important and are based on informed action in ‘a circle of planning, action and fact-finding about the result of the action’ (Lewin, 1946:40). The interrelationship of theory and practice is often highlighted, yet Dick *et al.* (2009) criticise that action research has its weaknesses in theory building. There is often no explicit statement on how theory influences the research process. An approach based on practical solutions produced through the experiences of the researcher as well as its participants, theory building is done fairly implicitly by the researcher or practitioner (Carr and Kemmis, 1986:15). To untangle implicit theory building is a major strength but also a weakness, as the link to theory is often not clearly stated and little guidance is given to counter this (Dick *et al.*, 2009).

3.3.3 The Combination

The research aims to give a detailed picture, a ‘*thick description*’ (Geertz, cited in Clarke, 2005:xxiii), of computer science education in Afghanistan’s higher education system, but it also aims to utilise the findings and derive concrete action in order to strengthen the discipline. With these two research aims in mind, I have combined situational analysis and action research, which fit well together.

Situational analysis is a contemporary approach and the combination with action research has not yet been often applied. There are, however, several examples of grounded theory being combined with action research (Baskerville and Pries-Heje, 1999; Henfridsson and Lindgren, 2005; Poonamallee, 2009; Teram *et al.*, 2005).

Noting the similarities, both approaches ground their theory from empirical data, yet grounded theory is clearer in how theory is generated, while action research is better for explaining how the data gathering involves informants and how the researcher is involved in the action (Clarke, 2007:363; Dick, 2007:398).

One major difference is the position of the researcher, as well as how research subjects are involved within the research process. Both grounded theory and situational analysis emphasise that understandings, beliefs and opinions of the participants are vital and that their participation is necessary to understand the context of the environment as well as their problems in their situation (Charmaz, 2003; Clarke, 2005).

Nevertheless, there are disagreements as to whether participants can or should actively contribute to theory building (Dick, 2007:406). A main characteristic of action research of generating knowledge in a more democratic way leads to an equal ranking for participant and research (Genat, 2009; Reason and Bradbury, 2008; Silverman, 1998). Levin and Greenwood (2001:105) point out the 'democratic ethos' of action research and stress the implications that might lead to it. Ideally, researcher and participants co-construct knowledge through collaboration, which is a mixture of professional and local knowledge. To overcome the hierarchy of knowledge and equalise the knowledge is challenging.

Grounded theory does not ask for active participation of the research group in the research process. Moreover, Dick (2007:398) stresses that this is not desired, referring to Glaser (2003) who discourages active involvement of the research subjects as well as the researcher. Clarke's (2005:14) situational analysis is more open to the position of participants as well as the researcher, and delivers tools such as situational and positional maps to open up perspectives and at the same time to encourage reflexivity. In situational analysis, the researcher is considered a part of the research situation, in a way similar to the understanding of action research where the researcher is recognised as an actor (Dick, 2007; Somekh, 2006). The concept of being in a situation and understanding the situation is dominant in both frameworks and offers the possibility to combine them (Genat, 2009). Action research highlights the

context-dependent insights, while situational analysis stresses context-free data by incorporating the context within the situation. Both approaches stress the particularity of situations and differ more in how to deal with the particularity. Action research does this by stating that the context matters and situational analysis does the same by incorporating the context within the situation.

Both approaches are cyclic; action research is more explicit about its cycles but situational analysis also continuously analyses the situation with re-representation and subsequent examination of the situation and their relations (Clarke, 2005; Dick, 2007). The four major phases of action research: plan, act, observe and reflect are the main phases that have guided this research, but in order to observe, reflect and analyse the situation, situational analysis has been a tool that supported this process (Dick, 2007). Figure 3-3 visualises the combination of action research and situational analysis.

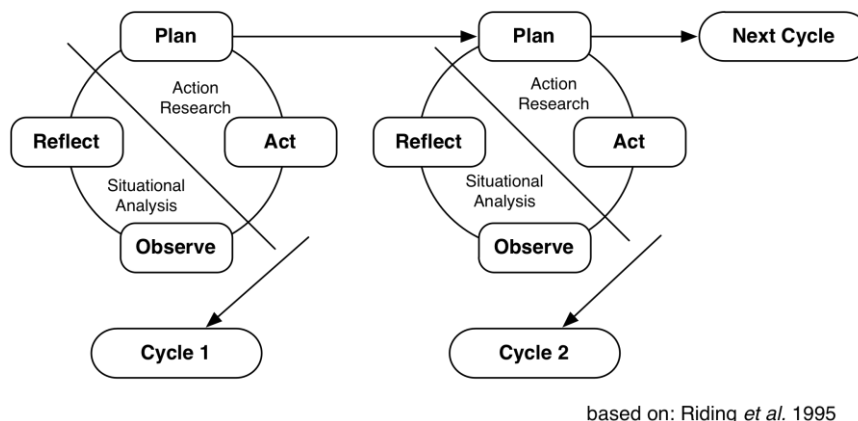


Figure 3-3: Diagram of the combination of situational analysis and action research

In this research, both approaches have been combined, but the participants have not been involved in the analysis of the data such as transcription or coding, as desired by some action researchers. Research results have been shared in institutional meetings, however, at the national IT conference, in informal meetings and have been discussed with the research participants and fed back into the research.

3.3.3.1 Limitations

In the implementation of the combination of situational analysis and action research I encountered limitations. The advantages of gaining understanding of

the situation through active participation and being responsive to the situation also brings challenges to the data collection process. In particular the participatory nature of action research raises questions of who and how lecturers have participated, as well as on the relationships between researcher and participants.

Carr and Lewin (1986) stress the necessity of a self-reflexive enquiry process as important. While in Section 3.6.1. I address my personal stance, I would like to stress here the impact of the data collection process on the lecturers, and thus on the reliability and validity of the gathered information. The key idea is to gain understanding through the experiences of the lecturers, and as such, the lecturers are not only interviewed separately, but they shared their understandings, experiences, problems, and evaluated strategies in meetings as well. What must be considered are the political realities in which the lecturers act. The social hierarchies or the cultural practices need to be considered as these restrict and limit the lecturers' actions. For example, the existing social hierarchies restrict lecturers to talk freely about colleagues or their superiors in the staff room or meetings. In order to uphold one's own respect or reputation, problems are often not laid out openly, which makes it difficult to validate and use the information truthfully. On the other hand, to strengthen own position and influence, rumours, or corrupt practices are prevalent among lecturers. To counter such limitations in participatory research requires a reflexive process, in which researchers need to be 'aware of how members of a group perceive and speak about their lives' (Sohng, 1996:84). Sohng (1996) further advises to learn about the community and their members and participate in their lives. My long experience working in different universities in Afghanistan was crucial to being able to evaluate and identify the situations in which lecturers were constrained in their opinions or actions. Over the years I have learned about the history of the country as well as social structures that were established over time. Nevertheless, limitations will always remain.

Participatory research contains not only limitations in how lecturers act among themselves, but there are also limitations between the researcher and the participants. The relationship between myself and the lecturers and how I

decided to interact with the lecturers needs reflection to explain limitations within the action research approach. While active participation, participatory methods, even playful knowledge production process is often one of the advantages to produce research where researcher and participants work on a level playing field with participants, there are challenges in it. It was important for me to work collaboratively with the lecturers together, at the same time it was challenging to identify and balance out how such collaboration works. Mohan (1999:45) points out the danger of participatory exercises are very value laden and full of assumptions of the researcher.

On the one hand, the participants are academic lecturers who are familiar with research methodologies and are open to an extent for new methods of inquiry. Nevertheless, lecturers inhabit a prestigious role and a position of authority, in which they also resist change. Mohan (1999:45) refers to Rogers who warns that research can be too patronising for the participants and at the end can alienate researcher and participants. Thus, I relied on discussions and meetings rather than mapping and diagramming together with the lecturers. This was quite limiting to the full potential of participatory research, in particular because of the sensitive relationship between foreigners and locals and their practices, it was necessary to balance lecturers' involvement carefully.

Additionally, actions we discussed among lecturers were often small adjustments, because lecturers were afraid that larger transformations would be too disruptive. Already the introduction of study groups, or full attendance of lecturers provided opportunities for fights and arguments. In order to not endanger the research process, I chose a not too disruptive approach, which means for me, that we as lecturers discussed and shared our experiences, and I facilitated as far as possible an open dialogue about problems and challenges within the faculty setting. Because situations were often highly charged, there were limitations to the action planned. Such limitations are common, yet it is important to reflect upon them as they open up questions about interpretation of knowledge.

3.4 Implementation of Field Work

The implementation of my fieldwork reflects the two main research aims, first to gain a deeper understanding and also to strengthen the computer science discipline. To ensure a *thick description* and an active integration of the lecturers in order to reach both aims, I chose to stay one academic year at a university in Afghanistan working as a lecturer. By being part of a computer science faculty, I could establish the trust and rapport which allowed me to gain an insight into the formation of the computer science discipline, as well as actively contribute to the strengthening of the discipline. My previous work experiences at the computer science faculty in Herat and these field experiences were very helpful for my understanding of computer science in Afghanistan.

Connecting the fieldwork with a lectureship at an Afghan University was an ideal way to reach the proposed goals. It had been realised through my work with the TU Berlin, who supported my decision and granted me access to their projects. Their projects in Afghanistan are the establishment of academic structures in computer science as well as the establishment of sustainable IT infrastructures and capacity building of IT professionals.

3.4.1 Choosing the Research Location

After the decision to stay one academic year in Afghanistan, I decided to go to Balkh University in Mazar-e-Sharif in the north of Afghanistan. Organisational reasons such as access and security within the country made Balkh University very attractive. Balkh University had a newly established computer science faculty. Only two official lecturers were teaching two classes. There was a high demand for lecturers. Further, TU Berlin already had collaborations with Balkh University and welcomed this decision.

I worked as a lecturer at the computer science faculty at Balkh University in close collaboration with the TU Berlin. This guaranteed an insight into faculty life but also provided the chance to contribute to the establishment of the faculty. While I stayed mainly in Mazar-e-Sharif, I also used the opportunity to visit the other universities. Due to previous work assignments there, deeper insight could be gained in short visits during my fieldwork.

3.4.2 Time Frame

Based on the academic semesters in Afghanistan (September-December 2012; April-July 2013), I planned my stay in Mazar-e-Sharif. In the past, it has proven to be useful to leave the country in order to reflect and simultaneously start the analysis of the collected data, both situational analysis and, in particular, action research support or even to require this (see Figure 3-2).

Especially in the first phase (September to December 2012) of the fieldwork, with the main purpose of observing and finding facts, the research relied on qualitative interviewing, participant observation and informal conversations. In the second phase (April to July 2013), after a first analysis of the situation, the ethnographic fieldwork continued, but lecturers were more actively involved in creating their academic space and making their own institutional platform, which enabled change (Berg, 2001:184).

Alongside my teaching during the semesters, I visited Herat University to interview and observe the computer science faculty there. Due to my long-term stay there from 2008 to 2010, the situation was very familiar, the academic and administrative staff well-known and I could get access quickly.

At the end of the first term, I stayed in Kabul for two weeks to help out at the yearly conference which is held in collaboration between the TU Berlin and the MoHE. I used the opportunity to interview lecturers from the other universities.

During the second term, I travelled to Kabul as part of a selection committee, testing and interviewing lecturers from nine different universities for a master's scholarship in computer science at the TU Berlin.

In July, I ended my fieldwork experience at Balkh University and returned to Edinburgh. After this, I interviewed Afghan lecturers in Berlin in September at master's graduation. For the same conference and project work for TU Berlin, I returned to Afghanistan in December 2013. Additionally, I was invited in June 2014 to the ten year anniversary ceremony of the computer science faculty at Herat University.

My research field work in an overview:

Date	Description	Location
September – December 2012	1 st academic semester (4 months) <ul style="list-style-type: none"> Teaching two subjects in 2nd class Joining university strategy committee Observation and informal conversations 	Mazar-e-Sharif, Afghanistan
End of November 2012	3 days at Herat University <ul style="list-style-type: none"> Interviews and informal conversations 	Herat, Afghanistan
December 2012	2 weeks at MoHE, visit of KPU <ul style="list-style-type: none"> Organisation of the national IT conference Interviews, informal conversations and visit at computer science department of Kabul Polytechnic Interviews of lecturers during the IT conference 	Kabul, Afghanistan
April 2013 – July 2013	2 nd academic semester (3 months) <ul style="list-style-type: none"> Teaching two subjects in 2nd class Co-teaching one subject in 2nd class Starting study groups with students Move to new campus and opening of IT Centre at Balkh University 	Mazar-e-Sharif, Afghanistan
June 2013	One week at MoHE <ul style="list-style-type: none"> Selection process for MSc scholarship at TU Berlin, exam and interviews of 53 lecturers from 9 universities Visit of computer science department of Kabul Education University, visiting laboratories, lectures and conversations of staff 	Kabul, Afghanistan
September 2013	One week at TU Berlin <ul style="list-style-type: none"> Graduation of MSc lecturers at TU Berlin and Foreign Affairs Ministry of Germany Panel on 'Innovation in HE in Afghanistan' Interviews with graduated lecturers 	Berlin, Germany
December 2013	Three weeks at MoHE <ul style="list-style-type: none"> Organisation of the national IT conference Talk at the national IT conference Project coordination of master's projects with graduated master's lecturers 	Kabul, Afghanistan

June 2014	One week at Herat and Balkh University <ul style="list-style-type: none"> • Attending the ten year anniversary celebration in Herat • Visit at Balkh University 	Herat, Mazar-e-Sharif, Afghanistan
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Table 3-2: Timetable of fieldwork

3.4.3 The Empirical Focus: The Actors

The empirical interest is to focus on the computer science lecturers at Afghan governmental universities. During the fieldwork, the younger generation of lecturers turned out to be my special interest, as they have ‘a particular feature or characteristics which will enable detailed exploration and understanding’ (Ritchie and Lewis, 2003:78), in this case, the computer science field. By younger generation, I refer to the lecturers who were newly hired directly after their graduation and have a BSc degree within the last five years, or those who received both their MSc and Ph.D. in the last ten years. This applies to all lecturers in the provincial universities (BU, HU, KonU, NU, QU, SZU), because their faculties were only recently established. Only at Kabul University and in parts at the Kabul Polytechnic University were older lecturers employed who received their postgraduate training longer ago. These lecturers were not excluded; I met and talked to some of them, yet the younger generation is much more motivated and engaged in the active construction of the computer science discipline. Postgraduate training is only possible in foreign countries right now, so younger lecturers mainly receive these scholarships, as they are more flexible to travel and often do not have larger family responsibilities.

The research focuses on all lecturers at the governmental universities, but due to security restrictions in the country, it was and remains not possible to travel to all universities. Therefore, I limited the research locations to the cities of Kabul, Mazar-e-Sharif and Herat. Though it was not possible to reach all lecturers, regular conferences and meetings in Kabul offered the possibility to involve lecturers from the universities in Nangarhar, Khost and even Konar. Some of the lecturers had been in foreign countries in order to pursue their education at the time of the fieldwork; I included the lecturers who pursued their master’s degrees at the TU Berlin.

3.5 Methods

Within the chosen frameworks, the dominant research methods for the data collection were semi-structured interviews and ethnographic methods such as participant observation, diary and field notes. In this research, ethnography is used as a method rather than seen as a philosophy (Atkinson and Hammersley, 1994:248). As Tedlock (2000:458) points out, methods become ethnographic when fieldwork is the centre of the researcher's intellectual and emotional life. My personal stance is explored further in reflexivity. In the following section, the methods used are described.

3.5.1 Qualitative Interviewing

Interviews are a valid method for exploring knowledge, opinions, experiences and perspectives of different actors within the group of lecturers (Denscombe, 2007:174; Silverman 2005). With the main purpose of gaining inside knowledge and 'get[ting] in someone's head' (Seale, 2004:182), qualitative interviewing has the possibility to achieve a depth and allows voices to be amplified that might previously have been ignored. Punch describes interviews as 'one of the most powerful ways we have of understanding others' (Punch, 2009:144). Out of the different types of interview, a semi-structured form was favoured. This method combines the advantages of structured methods where standardisation and comparability are relevant, and unstructured interviews where the interviewees are free to lead the conversation (May, 2001). The flexibility provides a greater opportunity for interviewees to develop ideas, let their creativity go and thereby possibly create constructive solutions (Denscombe, 2007:176).

In the interviews, the following topics were explored:

- the lecturer's own computer science education;
- their understanding of teaching;
- their understanding of computer science;
- their ideas and beliefs and the importance and applicability of computer science in Afghanistan.

Questions about the lecturer's computer science education aimed to obtain information about the lecturers: where they studied; their major field; their

motivation for studying computer science; why they decided to become a lecturer; what activities they enjoy the most in their current position; and how do they plan to use their computer science knowledge. Of interest are personal motivations of the lecturers and their individual experiences during their studies.

Questions about their understanding of teaching could explain how they conduct their own tasks and responsibilities. The MoHE has specific guidelines and expectations about teaching and so a comparison can be made of where opinions diverge and converge. Especially in creating a uniform curriculum, a common understanding between lecturers is necessary. Questions about teaching guidelines, how the curriculum has been developed, the structure and translating the structure into their daily work were asked.

Because these lecturers are shaping new developments, their knowledge and expertise is interesting. At the beginning, I asked what they think computer science is, and later on I developed my question further and asked, what is a computer scientist in Afghanistan? The questions targeted which knowledge they see as important for themselves but also for a graduate of their faculty, and implicitly asked what type of knowledge should be included in the curriculum. This leads to the lecturers' beliefs and ideas on how computer science should be taught. What do they think should be prioritised and why? What kind of curriculum should be taught, which kind of standards and technologies should be chosen and why? The questions seek to understand how their view is connected and shaped by their experiences in postgraduate training. Questions about the importance and applicability of computer science explore how computer science is necessary for Afghanistan. What kind of demand for computer science is in the country? Where are the gaps between the curriculum and a potential job market? Questions included: which jobs are graduates trying to get? What kinds of skills are needed? Are these skills and training covered by the education system?

3.5.2 Participant Observation

Participant observation is a method which is used mostly in ethnography. Silverman (2005:111) highlights observation as a method in qualitative research that is fundamental to the understanding of another culture. In this research,

participant observation was used because I have been a part of the group of computer science lecturers. There are different categorisations of observer position that can be taken. Seale (2004) emphasises that a researcher takes up a different kind of position throughout the research and is not bound to one. However, it is important to be aware and to reflect. To be able to enter different roles and experience the situation from different perspectives, data can later bring interesting interpretations (Alvesson and Sköldberg, 2000:193). Atkinson and Hammersley (1994) emphasise that one has to be aware if the research is known by those being studied, about what and how much is known and how I, as a researcher, position myself within the situation. Participant observation is an interactionist method and aims to make observation of other member's behaviour (Seale, 2004). It contains the observation of activities, informal conversations and informal field notes (Atkinson and Hammersley, 1994).

In the computer science faculty at Balkh University, my role was similar to other lecturers. Therefore, I did participant observation of the institutional meetings and the daily activities in the faculty outside the classroom. In the institutional meetings, I was interested in the power dynamics among the computer science lecturers as well as between lecturers from other faculties, the administration and members of the leadership, such as the dean, the chancellor and the MoHE. How is the expertise of the computer science lecturers needed and used? How much are they involved in administrative matters? This leads to questions like, how much actual influence does the actor group have?

This has been discussed and talked about with lecturers of faculties other than Balkh University. I examined how the group positions itself within the higher education system and contrast this with the position the MoHE and the international community envisages for them. This kind of observational data can prove helpful to see how their expertise and knowledge can be institutionalised and formalised later on.

It interested me how the lecturers were embedded, not only in the local system but also in a strong international network. The connection to the international community and its involvement is an important factor in a country

which is so dependent on foreign aid and investment. Many donor organisations approach the lecturers; how this takes place is a central part of the observation.

Additionally, I engaged in classroom observation to see how lecturers convey the curriculum content to their students. These observations proved useful to compare how the description and information provided by lecturers (given in the interviews) fit with my observations.

Interesting to observe were the events where computer science lecturers came together, such as the national IT conference which takes place every year in Kabul at the MoHE, but also events such as the graduation ceremony of the master lecturers at the TU Berlin. In both events, the minister, the deputy minister and executive directors of international organisations are present. In Berlin at the graduation ceremony, the head of the taskforce for Afghanistan from the German Government, the vice-president of the TU Berlin, the dean of studies of the school of electrical engineering and informatics at the TU Berlin and other key decision-makers discussed together with the lecturers from the computer science faculties the future of Afghanistan's higher education system and the lecturers' involvement in it. In this combination, the surrounding conditions became very apparent.

3.5.3 Informal Conversations

Informal conversation is not explicitly named as a research method, yet it appears both in literature on interviewing along with participant observation and ethnography (Becker and Geer, 1957; Ritchie and Lewis, 2003; Seale, 2004). Hammersley and Atkinson (1995:139) introduce informal conversations as a type of interview in ethnographic research, while Seale (2004), for example, introduces them as part of ethnographic observation in the collection of field notes.

An informal conversation is very close to an informal and unstructured interview, in the end an interview is just 'a conversation with a purpose' (Burgess, 1984:102; also Becker and Geer, 1957:28; Dexter, 1970:123; Lewis and Ritchie, 2003:115; Rubin and Rubin, 2005). Informal conversation sways smoothly

between qualitative interviewing and participant observation (Becker and Geer, 1957:28).

Although both (see 3.5.1 and 3.5.2) have already been presented, informal conversation is additionally mentioned as it was a common method during field work.

The decision to refrain from the use of qualitative interviewing was based on several reasons. In order to obtain the insight preferred, a main objective was to create a space which is welcoming, trustworthy and comfortable for all. Qualitative interviewing would have not ensured this space.

However, there was a lack of physical space within Balkh University. Many people shared the room; there were no separate offices for lecturers so the room where we all stayed was the office of the dean. Lecturers were under observation by a superior which meant that interviewees could not talk freely. Becker and Geer (1957:30) point out that interviewees might not talk about specific subjects because they are afraid of being impolitic, impolite, insensitive or similar, and suggest that this can be avoided by observing the participants in their daily work to discover these issues.

Further, with the approach from action research to see research participants as equals, informal conversations feel much more natural. The lecturers and most faculty members, not only at Balkh University but also at other universities, were known for a long time and best insight could be gained through informal conversations.

The data collection of the informal interviews has been covered by recorded or written field notes. Seale (2004:234) stresses that field notes of conversations should capture the content as well as the action taking place at that moment. Hence, verbatim field notes have been often used to grasp and describe the situation as fast as possible after.

3.5.4 Additional Remarks

In this thesis, the identity of the participants has been anonymised. The focus is not on individual lecturers but on the lecturer group in common and the processes in the development of computer science. Thus, there is no need to

reveal the individual identities, further shielding them from any consequences of their statements.

Furthermore, quotes from the lecturers have sometimes been corrected stylistically to improve the readability for the reader. In all cases, the male form is used. Due to the small number of female lecturers in only four faculties, using the female form can reveal the identity of the informant. In order to prevent any conflicts which might result from the statements, I decided to remove gender indicating forms.

3.6 Reflexivity and Validity

To identify researcher bias and ensure validity in the research process, Robson (2002) stresses the use of reflexivity. The following will distinguish between personal reflexivity, which emphasises the specific nature of the researcher, and the epistemological reflexivity, which focuses more on how research questions can define or limit the outcome and leads also to the validity of this research (Robson, 2002).

3.6.1 Personal Reflexivity

Agar (1996:91, book chapter capitalised by author) asked ‘Who Are You To Do This?’ and stresses that the personal and cultural background of the researcher and the attitude and relationship towards the researched group influences the research process as well as its findings. The question is: who am I to do this? Furthermore, what is my stance as a researcher towards the participants (Blaikie, 2010:50)?

My research arises from personal interest and long-term work in Afghanistan. For the past eight years, I have worked as a computer scientist in Afghanistan and have taught at universities there, led TU Berlin projects and was in close contact with the students as well as the MoHE administration (see also Mahr and Peroz (2006)).

To conduct research as a ‘detached observer’ (Blaikie, 2010:50) is not possible, and my personal aim was rather to integrate the academic staff in the research and work together with them. Therefore, I took the role of a ‘reflective

partner' (Blaikie, 2010) or 'dialogic facilitator' (Blaikie, 2010) and listened to the lecturers who are the experts on their country, but I also relied on my understanding of the situation (Fontana in Blaikie, 2010:52).

Ethnographic or participatory research in a natural setting leads immediately to discussions about insider and outsider knowledge and access. Being involved in the development of IT structures in the higher education system in Afghanistan makes it difficult to categorise myself as either in- or outside. Mullings (1999:340) points out that such categorisation 'ignores the dynamism of positionalities in time and through space. No individual can consistently remain an insider and few ever remain complete outsiders'.

There are obvious cultural and social barriers which cannot be overcome, even through long-term experience, linguistic proficiency or just individual personality.

Reinharz (in McIntosh, 2010:50) titles personal attributes such as gender, ethnicity, race, age, language or education the *brought self*, but also mentions two other selves, the *research-based self* and the *situationally created self*, who influence the research process.

Unpacking these self-presentations means recognising the dichotomy of my personal stance as a computer scientist, development worker and my position as a social science researcher. With a combination of field and professional work, I became a mixture of a social scientist, a computer scientist and a development worker. Computer science, the way I studied and worked with it, is lived as a very positivistic discipline. Social implications are regarded as minor circumstances and are not recognised as shaping factors of the body of knowledge of a discipline, for example. Also, my beliefs and values as a development worker are in general the belief that countries need to develop into modern societies and that this is reached through science and technology. Very rigid belief systems often conflict with the interest of a social scientist in understanding how things are rather than how things should be.

Constant reflection to distinguish between work and research were required. The Afghans with whom I worked had to adjust to my new role. While

positions were shifting and will again shift, Mosse (2005:11) emphasises that such new links need to be 'explore[d] rather than conceale[d]'.

Conducting social research about development in computer science as a computer scientist also requires that I 'make the familiar seem strange and the strange seem familiar' in order to open new perspectives. Mapping tools that are offered in situational analysis helped to do this and have proven useful in previous as well as in this research.

3.6.2 Epistemological Reflexivity

The research questions target computer scientist lecturers, but the focus has slightly shifted onto the recently qualified and younger generation of computer scientists. This can lead to conflicts and biases in the research. Becker (1967:241) stresses that 'we provoke the charge of bias, in ourselves and others, by refusing to give credence and deference to an established status order, in which knowledge of truth and the right to be heard are not equally distributed.' The hierarchy of credibility in the higher education system is very difficult to define. I would not identify the younger generation as a subordinate group, nevertheless there is a division between the older and younger generation of lecturers which is not openly discussed. Such hidden conflicts need much insight and make reliable data scarce, but do not imply that research is impossible (McNerney, 2009).

The older generation holds most of the decision-making positions and most have no computer science background because the discipline was not yet offered during their time in education. The younger generation has updated knowledge because scholarships were available to them. Nevertheless, it is very difficult for them to reach positions where they can actively influence developments. However, the younger generation is favoured by international organisations due to their updated knowledge, their fluent English skills and their motivation and commitment. While my empirical interest lies with the younger generation, I had continuous and frequent contact and interaction with all actors within the particular situation. Their perspective and understanding has also

been documented and integrated in the data, yet only a few interviews with the older generation of lecturers have been conducted in this research.

To shift the focus to the younger generation might be advocacy research, but, as Hammersley (2001:96) states, 'a researcher can take account of more than one perspective, rather than simply having to line up with one side or the other.' In particular, situational analysis delivers tools to unfold these perspectives with positional maps. Positions are heard without connecting them to specific people, and even positions which are not taken are made to speak (see also 4.3 about Positional Maps; Clarke, 2005:136).

3.6.3 Validity and Reliability

The validity and reliability of collected data and further analysis is the core of qualitative research. It is essential to be aware that qualitative research is value-laden and subjective. Some qualitative researchers do not seek a generalisation or replicability of the data and rather emphasise the *thick description* (Blaikie, 2010:217). Lincoln and Guba (1985:219) introduced a scheme that transfers the scientific paradigm to inquiry in a natural setting. In the following, I reflect on the terms 'credibility', 'transferability', 'dependability' and 'confirmability' to ensure good qualitative research.

Based on Denzin (1970), Lincoln and Guba (1985) propose different kinds of triangulation⁴ for ensuring credibility. Action research and situational analysis do a *data triangulation* through their iterative cyclic process. With the integration of different qualitative methods such as semi-structured interviews or participant observation, data is *methodologically triangulated*. An *investigator triangulation* has not been done, but action research involves the participants, so different perspectives are reflected and the research is not guided by the

⁴ Triangulation is a technique proposed by Denzin (1970). He recommends multiple triangulation in order to overcome intrinsic bias. It includes data triangulation, investigator triangulation, theory triangulation and methodological triangulation. Data triangulation refers to the use of several data sources, investigator triangulation refers to the use of several investigators/observers, theory triangulation means to have several hypotheses in mind, whereas methodological triangulation characterises the use of several approaches (ethnographic observation with interviews, qualitative and quantitative methods)

researcher alone. *Theory triangulation* was not pursued, as the research does not test a hypotheses.

While Lincoln and Guba (1985) offer a scheme to ensure credibility, another point is the transferability of research results. A challenge for research in a particular setting, in this case the higher education system in Afghanistan, is whether or not research findings can be transferred to other contexts. Seale (2004:78) argues that *thick descriptions* can put the reader into the exact situation and thereby reach a kind of transferability. I aspire to deliver such a *thick description* here. Dependability replaces reliability and Lincoln and Guba (1985) seek through auditing to present sound documentation of the data. Throughout the auditing process, reflection on how the research has been conducted to reach confirmability is encouraged. Lincoln and Guba's (1985) model has been considered in this research design as far as possible and has been kept in mind throughout the research process.

3.7 Limitations and Ethics

Every research has its limitations; some have been introduced. A major limitation regarding the feasibility of the research is the unstable political situation of Afghanistan. Fortunately, no travel restriction were in place in Kabul, Mazar-e-Sharif or Herat during the fieldwork period.

Previous fieldwork, which also took place in Afghanistan, was conducted at ethics level 3 so the same ethics level was applied to this research. The high level was chosen due to potential risk for the researcher. The Foreign & Commonwealth Office (FCO) advises against 'all travel except essential travel to Afghanistan' (FCO, 2012). Afghanistan holds many risks, of which I am aware and familiar. Due to the connection of fieldwork with professional work, which is through TU Berlin and funded by the German Foreign Ministry, my security has been ensured through the Risk Management Office of Germany's development agency (GIZ) which administrates the security of most German development workers.

The presented research has been conducted in a participatory and collaborative manner. Informed consent is a major requirement especially

because research outcomes, even collaboratively developed, might have an impact on the participants (Brydon, 2006:28). All participants, as well as the MoHE, are aware that I am currently conducting my Ph.D. studies at the University of Edinburgh and that I am working for TU Berlin or, more specifically, for Dr. Nazir Peroz, head of the ZiiK of TU Berlin. I explained my academic interests and informed them about my research. The research focus is on the group of lecturers, whom I know very well. Due to this and my long-term involvement, I chose to abstain from collecting too much personal information, which might be useful to generate personal stories. Many of the young lecturers know me and I have known them for a long time. So, personal data is known; with the application of situational analysis I have chosen an approach that abstracts the positions of individuals, groups or institutions.

Due to my work as a lecturer, I was in regular and frequent contact with the students inside and outside the classroom. They were aware that I was writing my Ph.D. thesis at the University of Edinburgh, though they were not informed of my research directly. The students were not in the centre of this research and were not explicitly questioned for that reason. Nevertheless, I talked with and asked them about their situation in order to make a needs assessment and requirements analysis for the computer science faculty. This was agreed upon with the dean of the faculty and was conducted more in my capacity as a foreign computer science lecturer.

3.8 Summary

This chapter presented the decisions that I took in order to conduct the research. Based on the two different research aims, I have chosen a combination of situational analysis and action research to answer the research questions and research goals. The approach, as well as the methods used, have their limitations. To ensure reliability and validity, the chapter provided details of the research setting and the implementation of this research project. The research environment has been presented in detail and my involvement further explained. The implementation of the fieldwork includes the activities where I participated, as well as the research methods that have been used in the data collection.

In the following chapter, I introduce situational analysis in more detail. This will give an insight into how the data analysis has been conducted. The different tools that situational analysis offers (see 3.3.1) are introduced, whilst the subsequent Chapters 5 and 6 present the interpretation of the data.

4 Findings and Situational Analysis

In this chapter, the focus is on applying situational analysis. In 3.3, situational analysis was introduced regarding its combination with action research. Here, the focus is on the actual application of situational analysis during fieldwork. This means that the situation with its elements (see also 3.3.1 and 4.1.1) are introduced. Thereby, the arena in which computer science developments take place is described. This provides an overview and access to the data as well as to the tools that have been used to analyse the data. The subsequent data chapters (see Chapter 5 and 6) present the interpretation of the data analysis with situational analysis.

The analysis of the data has been done iteratively throughout the whole period of the fieldwork. Situational analysis is a powerful tool to analyse data and has been used throughout the research. Dick (2007:402) emphasises that action research can benefit from grounded theory approaches. Situational analysis can help to build a theoretical understanding and analyse the data more systematically (Dick, 2007:399). Clarke's (2005) approach uses the coding mechanisms of grounded theory and introduces several instruments to establish tangible findings. She calls the different analyses and maps that are created with her 'tools' analytical exercises (Clarke, 2005:84), which help to move around in the data and think about them systematically.

Three different analyses and maps are part of situational analysis

- 1. Situational maps with relational analysis**
- 2. Social worlds/arenas maps**
- 3. Positional maps**

These analyses support the objective to deliver a '*thick description*' (Geertz, cited in Clarke, 2005:xxiii) of the situation by producing maps that create a representation of macro-, meso- and micro-levels of the situation.

The use of maps is encouraged as they can be beneficial in opening up data in new ways. Further, they can 'provide [a] useful and novel way to communicate

meaning and knowledge' as well as 'serve both as a means to collect data and as a means to facilitate understanding' (Wheeldon and Åhlberg, 2012:174).

In situational analysis, due to its abductive research methodology, maps are created during the data collection processes and are continuously refined during the process. When the maps do not change much anymore, the data are saturated and, in Clarke's (2005) understanding, reach a final outcome. This approach aligns with Strauss and Corbin's (1998) saturation approach in grounded theory.

In the following, the tools situational maps and relational analysis along with social worlds and positional analysis are briefly presented.

4.1 Situational Maps and Relational Analysis

With situational maps, the focus is on the situation. Clarke (2005) stresses the grounding in the situation, drawing on Thomas and Thomas (1928/1970), Mead (1927/1964), Mills (1940/1970) and Haraway (1988). A situation is a dynamic state where reality is constructed through the action of actors and actants and their consequences. These actions are representations of the different perspectives of the actors and reality is built upon the variety of perspectives. While actors define the situation through their actions, the situation itself influences how actors act. Thereby, situational questions help to understand the broader situation (the context). Yet, by acknowledging the researcher's own position, the result is that situational maps display their own ontological perspectives in a macro-level articulation of the researcher (Den Outer, Handley and Price, 2012:2).

To incorporate the different perspectives and positionalities, situational maps collect not only the human, non-human actors and elements but also discursive constructions of these actors as well as symbolic, cultural, political, temporal and spatial elements. In the following, elements that are present in a developmental context as well as in an academic context are incorporated and have been categorised as such (see also ordered version in 9.2.2).

4.1.1 Creating Situational Maps

Clarke (2005) emphasises that the maps are in a continuous evolution and are not the outcome of an analysis. They are already in use during data collection, and the following maps have been created and expanded throughout fieldwork. Figure 4-1 shows maps on my whiteboard in Mazar-e-Sharif, Figure 4-2 being one of many early maps. In reaching an abstract situational map, many messy working versions have been produced. In the following, the selected elements which mattered for the creation of the maps is explained. The first part (see 4.1.1.2) presents the human actors – individual and collective as well as silent actors. The second part (see 4.1.1.3) introduces non-human actants. Both parts already highlight other elements (in bold), but also the surrounding elements are summarised in 4.1.1.4.

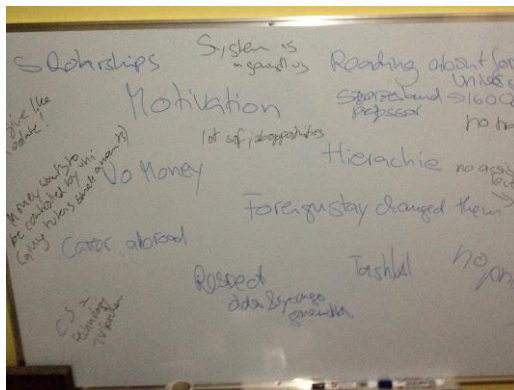


Figure 4-1: Messy situational map, whiteboard in Mazar-e-Sharif (Oct 2012)

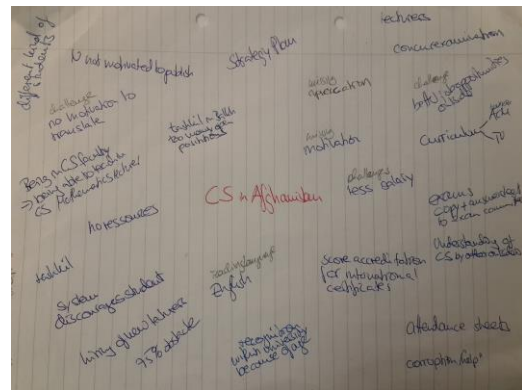


Figure 4-2: Messy situational map, paper version in Mazar-e-Sharif (Dec 2012)

The final situational map, which has been used for the analysis of the thesis, is presented below (see Figure 4-3, for a larger map see Appendix 9.2.1). The different categories used are presented in a separate text box nearby. The map is shown colour coded according to the categories; for later usage in relational analysis, the colours have been removed.



Figure 4-3: Situational map of Computer Science in Afghanistan (see also 9.2.1)

4.1.1.1 History of the Higher Education System

The situational map presents a variety of different elements such as political/economic elements, social-cultural/symbolic elements or temporal elements. In the introduction as well as in the later data chapters, the elements have impact on the understanding and analysis of the situation. In the following, emphasis lies on the developments and influences that have shaped the higher education sector of today. Education has always played a pivotal role throughout the history of the country. Moreover, the political nature of the introduction of modern education in Afghanistan is an example of the way in which approaches of modernisation have backfired repeatedly. Rubin (1995:53; 1991:74) describes how during the reign of Habibullah Khan⁵ (1901-1919), the country opened up to modern education and created a new class, the one of intellectuals and the one of clergy. The main objective was to use education as part of a state-building

⁵ Habibullah Khan (1872-1919) was Emir of Afghanistan from 1901-1919, eldest son of Abdul Rahman Khan which he succeeded.

process and train an elite for state administration, what Gellner (1981) describes as creating 'political cohesion at the top (...) by artificial creation of a new elite'.

In particular Habibullah identified subjects such as engineering, accounting, modern medicine, military sciences and European languages important to his new operational style of governing. This meant that new subjects had to be introduced to the rather religious and traditional education curriculum. But because of a non-existent education system, expertise and knowledge needed to be imported, either through foreign teachers inside Afghanistan, or by sending Afghans abroad. Habibullah opened the high school 'Habibia', which was supported through foreign funding and foreign teachers who were teaching there. Many of Afghanistan's political and academic elite studied at the Western-oriented high school. King Amanullah further opened the education system to foreign influences. He not only opened several elite high schools such as the French Lycee (Amanjya), the German Amani High-School, moreover, he established policies that encouraged academic exchange, by sending elite students abroad for higher education.

In 1932, the establishment of a higher education system began with the Faculty of Medicine under French support, which traces back to the French-exile background of the ruling Musahiban family (Rubin, 1991:78). More faculties opened, each faculty received financial as well academic support (professors and scholarships) from foreign donors. Furthermore, university partnerships were often established to enable intensive exchange. The different subjects were distributed to particular countries, so that medicine, law and political science were supported by French, Americans sponsored agriculture, engineering and education, and Germany the faculties of science, economies as well as a department of anthropology. Egypt supported the faculty of sharia. All these different faculties were united in Kabul University in 1947. The Soviet Union sponsored the Kabul Polytechnic University on a different campus in 1963. It is noticeable how foreign countries influenced the Afghan education system. The financial support of foreign countries led to a growth of the education system in Afghanistan. More and more students received opportunities to study at Kabul

University. In the late 1950s, much foreign aid flow into education systems in Afghanistan.

Rubin (1991, 1995), Roy (1990), Sawitzki (1972), or Eberhard (1962) observed the micro-dynamics within Kabul University and Kabul Polytechnic Universities, the two foreign sponsored universities. Thereby, they stressed that access to Western-oriented and sponsored high schools were the first filter for university enrolment. Access was to all times depending on patronage networks and tribal-ethnic networks, which resulted in only a small group of Kabul's elite studying in these institutions.

The enrolment numbers quadrupled in the early 1960s, but numbers were minor, with 3,451 students in 1965 (Rubin 1995:70). This group however had 'disproportionate power', which was reflected in student demonstrations at Kabul University at the time, which lead, for example, to the resignation of political leadership, in this case Prime Minister Mohammed Yousef. While 'intellectuals' gained more power and recognition, rulers at all times limited the access to real power, so that the government was still under control of a limited number of mostly kin and relatives.

The introduction of modern education, the opening of the country to foreign influences, training state-elite abroad had its price. The traditional social control, which had been the dominant control mechanism, weakened. The ideologies and experiences and ideas were diverging within families, alienating parents from their children. Rubin (1995:75) showed that Kabul University and its dormitory, where students lived without their family control, were breeding areas for a mixture of ideologies, some more radical than others. Universities offered the space to organize collective identities and to connect with like-minded people. According to Sawitzki (1972) the dormitory, where 1,200 students lived in 1967 was the centre of insurgents.

The new political reforms that were introduced in the late 1960s created new expectations among the population. Barfield (2010) stresses that the failure of the government to address growing demands in public services, infrastructure and standard of living fuelled resentment in the population. In particular, the young educated elite in the universities saw the political system as an obstacle

for Afghanistan's development (Rubin, 1995:81). Many students joined and formed groups with radical and extremist ideologies, on the left and the right. Most members had gained education abroad and brought new perspectives back to the country, and moreover they were able to tap into foreign financial support/funding to support their ideas. Recognising the radicalisation in two extremes, Islamists and Communists, Daoud affiliated with the leftist educated elite and with the coup in 1978, he sided with the Russians. The Soviet invasion changed the political landscape dramatically. In particular, the Western-trained elite was arrested and killed, which resulted in a refugee movement of many elites. The following political conflicts and the civil war further destroyed the higher education system.

In summary, various political elements influenced the country's education system over time. Further, it can be seen that today's structure of the higher education system builds again foreign funding, in which specific faculties are sponsored by specific countries. Countries and university partnerships from the past have been revived, in particular at Kabul University, and this approach has been expanded to other universities. Further, it presents the particular role of students and lecturers within society. Something which will be discussed further in 5.2.

4.1.1.2 Human Actors and Their Discursive Constructions

One part of situational analysis is the collection of human elements that take part in the situation. Clarke (2005:87) emphasises the inclusion of all individuals, groups, organisations, institutions and subcultures, even if their presence is not strong at all times. The discursive constructions of these are presented here.

The primary interest in this research lies on the **lecturers**. The lecturers are seen as individual actors. The **dean of a faculty** is a lecturer himself, but has been recognised separately as an individual actor. Most lecturers mentioned that they see their job as a **service to help in the reconstruction of the country** as well as a **way to share their knowledge** and so give something back to their people. The role of a lecturer within Afghan society appears to be very important. Many other elements are connected to this. Being a lecturer, one has to act in

certain ways, one is seen to hold specific responsibilities. Later on in 5.2, the role of the lecturer will be discussed at further extent.

Other human actors within the daily life of computer science are the leadership of the **university**, the chancellors and vice chancellors, the leadership of the **MoHE**, the minister and the vice-ministers, as well as the **IT department**. The IT department of the MoHE is normally responsible for IT projects but, because of the lack of local expertise, IT and computer science are often mixed up and the ministry consults the IT department for computer science education questions. Furthermore, computer science lecturers are often involved in IT projects, which impedes a clear distinction between computer science matters and IT matters. Most perceive the **IT department as a controlling point** of their activities and way of working. Moreover, struggles over influence, responsibilities and autonomy are present.

The same applies to the MoHE and its departments which are concerned with the hiring and promotion of lecturers, salary payments or other administrative issues, for example. Administrative decisions are regulated through the MoHE but academic decisions also have to be acknowledged by the MoHE and its diverse departments. The term times, the exam times, the types of questions in the exam and many more aspects are defined by the MoHE. The MoHE, due to its centralised role, is supposed to regulate and monitor all activities. Because of the loosely defined responsibilities in the newly founded IT department (2006), issues and struggles are present between the IT department and the computer science lecturers. As the focus here is on the computer science faculties, all involved are summed up in the **MoHE** as an organisational actor and have been included as silent or implicated actors as well.

Lecturers from other faculties play a role in the daily life of computer science faculties, recognised here as organisational actors in **other faculties**. For example, when lecturers from other faculties ask for help about any IT-related issue, the computer science lecturers seem to be obliged to help. Being seen as unhelpful could affect their careers or harm administrative processes within the faculty. In meetings with deans or in other university-wide committees, these relationships become obvious. During exam times, these relationships become

very apparent, as many lecturers ask for favours for specific students to help them in the **exams**.

It becomes even more obvious how social structures in society are connected to the academic world when one observes how relatives of prominent representatives of society, such as the circle around ministers, governors or **members of parliament**, try to influence the situation by asking to pass their relatives in exams. This is not perceived as **corruption**, rather it is viewed as **being political** and **keeping everybody happy**.

These demands and requests can create a lot of tension during exam time. In particular, at faculties which are in the establishing process with very young lecturers, their newly gained positions limit their assertiveness. As many things are needed, from permissions to resources like rooms and materials, lecturers who depend on approval and decisions of superiors struggle with how to deal with such demands. With the presence of **foreigners** like **me**, disruptions are inevitable. As a foreigner, one is not included or dependent on Afghan social structures. Thus, through my presence, for example, problems could be shifted to me rather than other lecturers.

The **presence of foreigners** has an enormous impact as can be seen in the previous example. Donors, aid workers and foreign diplomatic officials are evident in the situation. The number of aid workers or foreign academics working continuously within the university is quite low. Foreigners tend to take roles as consultants in administrative issues or short-term visits rather than teaching or research. At Balkh University, there was one long-term consultant/lecturer at the computer science faculty apart from me, which is quite unusual compared to other computer science faculties. Furthermore, various consultants from different countries and organisations were visiting the university to see the progress of their projects or to try to offer help. Lecturers and students ask mostly for scholarships and laboratories. The **lack of resources**, financial and material, makes foreigners an important partner in the reconstruction process.

An important actor group which is often silent in discussions about the higher education system are the **students** themselves. They are interacting mostly with the lecturers but are not present in decision-making processes as a

whole, thus often perceived as silent actors. They are seen as very demanding with **high expectations**, but also as not being hardworking. Moreover, they **put less effort into their studies** in general.

The human actors included in the analysis are the lectures, the deans of Herat, Balkh, Nangarhar Universities, the chancellors of the universities, the MoHE, the donors, the students and **me**. Clarke (2005) emphasises the positionality of the researcher and encourages reflexivity, yet never includes the researcher. I go beyond this by using action research, where the researcher deliberately influences the situation; I believe that including myself in the map has its justification.

4.1.1.3 Non-human Elements and Their Discursive Constructions

The decision of which non-human elements are relevant to the situation were much more difficult to decide. The question that had been asked is, '*What nonhuman things really 'matter' in this situation of inquiry, and to whom or what?*' (Clarke, 2005:88).

With the target group being the lecturers, the main question was, what mattered to the lecturers and what mattered in the construction of computer science discipline at their university? There are several aspects presented in the following section, but the order of the elements is not based on a ranking of their importance for the situation.

One significant element which came up during the whole period of time was the **strategy plan** of the university. The MoHE had ordered the universities to submit strategy plans. The universities assembled a committee whose task it was to update a previous strategy plan draft. I also took part in this committee on behalf of the computer science faculty. Further, the university requested the faculties to design a strategy plan as well. The aim was that all lecturers of the computer science faculty developed the strategy plan. In the discussions about it and in its development, many issues became apparent, which will be examined in depth below. First, I have been asked to help, as **foreign strategies are seen as better in other countries and thus highly valued**. The aim was to develop a strategy plan in a collective manner, which was also a challenging process. On the

one hand, everyone wanted to have a say and had ideas, as it was seen as a document that could help the planning and future of the faculty. At the same time, all agreed that the university or the MoHE wanted to have the document and would attach it importance until it was officially accepted, but later on no one would be interested in it. There is not much controlling or monitoring, often plans or documents are made to present the efforts made. Even so, some thought that it should not be specific as it might have adverse effect later if goals and targets were set too high and could not be reached. The **trust** that this plan was only of benefit to the faculty was not evident. Many different and contradicting opinions were expressed; it seemed that the process of wording down this strategy plan also depended on other elements.

Another element is the *tashkil* (تشکيل), the main organisational structure for the computer science faculty. Including the number of personnel, the budget and the resources, everything is organised in this document. Because it contains various aspects, all refer to this term and it is not translated. The organisation of the *tashkil* and the allocation of resources and budget for the faculty depends on the MoHE. This centralised **bureaucracy** often becomes quite inflexible in cases where quick changes or adaptations are needed.

Most lecturers state that the *tashkil* in regard to the number of personnel is too small for their faculties. At Balkh University, the *tashkil* is quite small for the teaching demand of the faculty, but many positions are vacant. It is difficult to attract new, highly qualified lecturers, especially to the provincial universities. Kabul, the capital, is far more attractive; there is still a discrepancy between **urban and provincial**, which can be felt in attracting lecturers.

Another element that influenced many discussions was the **attendance sheets/books** of lecturers, students and all other staff inside the faculty. Every lecturer has the responsibility to attend the university every day and has to sign the attendance book to verify this. If the book is not signed, the salary is not paid in the full amount. Yet sometimes the staff just come and sign for the day, sometimes for several days, without even being present. **Attendance has an importance** formally, but in practice it is not exercised at all, especially on Thursdays, which are official working day in cities except Kabul, when no

lecturing takes place, the university campus is closed and it is not possible to enter the building. While the absence of lecturers and superiors upset others in the team, nobody would dare to cross the **signature** field of that person. Interestingly, the real attendance was less important than the signature in the book. Students also have to attend the classes - this is compulsory. If they do not attend a specific percentage, they are not allowed to take the **exams**. Here, too, if students were not present, they pleaded for exceptions and negotiated their attendance in the exam.

The **exams** and the exam time are always a very uneasy period. The atmosphere is full of tension. There are two exams in one semester, a midterm and a final exam. Shortly before the exam, attendance drops or students do not pay attention anymore. They want to focus and study for the exam. The exam has to have a particular form, which is prescribed by the MoHE. The types of questions, be it multiple choice, blank-filling, true or false etc. and the percentage of it, is set. There was a discussion whether these types of questions allow students to demonstrate their understanding of their subject, but **scientific decisions** are often made on an **administrative level**. A change of new teaching or examination methods to ensure that students understand the topic and are able to solve questions based on problem-solving techniques was not possible.

Another issue related to the exams was that family, lecturers and others were approaching the lecturers to ask for help during the exams or afterwards. It is crucial to pass the exam, otherwise the student will bring shame to the family. Calls from morning to evening with parents standing in front of the houses of lecturers are not unusual. The line between **private and professional** world is blurring. For young lecturers, it is difficult to handle these approaches, as consequences can follow if they are not seen to be playing by the rules and being diplomatic in the handling of these requests. It was often **demotivating** and tiring to see how **knowledge seemed less powerful than relations** and students passed because they had strong **relations** within the society, not because they performed well in exams.

There are many challenges which concern the computer science discipline. For example, the development of a **curriculum** is one process that is still quite

controversial. Similar to developments in the West (see 2.1.3.2), many formal and informal debates and struggles arise around curriculum development. The curriculum has to be acknowledged by the academic committee at the MoHE, and the curriculum itself has been given to the academic committee of the university. The MoHE sets specific requirements for the structure and the number of credit points. The curriculum says a lot about computer science education in Afghanistan. Kabul University has developed their curriculum based on the ACM/IEEE curriculum (see also in 2.1.3.2) and other universities have taken this approach. Often the dean or department head has compiled it and has sent it to the MoHE, which needs to give the final approval. In the case of Herat University, the TU Berlin has designed a curriculum, based on bachelor education in Germany, which was itself adopted from the ACM/IEEE curriculum in the 1970s. Nevertheless, Afghan lecturers distinguish between the TU Berlin curriculum and the ACM/IEEE one. These struggles are often not informed scientifically, rather they are about the political and social influence of particular lecturers or universities in the design of computer science education in Afghanistan. The computer science curriculum from the TU Berlin is also implemented at Balkh University, will be used at Qandahar University and has been given to the dean of Nangarhar University, for example. The MoHE aims for a standardised curriculum, a policy that leads to many debates over which versions are better. For several years, no agreement was reached. As many of the computer science lecturers have been trained at the TU Berlin, they are more familiar with this curriculum and implement it in a similar way. In other faculties where fewer people received their education from TU Berlin, they defend their own curriculum. Here again, many power struggles are based on an individual's background, training or similar; this leads to symbolic and political discursive constructions.

The education of the lecturers is essential. Because there is no higher level than bachelor education within Afghanistan in computer science, any further courses at **MSc and Ph.D. education** levels are only possible outside the country. Getting a **scholarship (MSc or Ph.D.) is necessary**, and the demand is immense. Several countries offer **scholarships**, but in computer science it is the US, UK and

Germany which are the countries that many favour. Yet many other countries offer scholarships. I met lecturers who went to India, Turkey, Bangladesh, Pakistan, South Korea, US, UK, South Africa, Italy, Iran, Thailand, Estonia and Germany. All scholarships granted through the MoHE have the condition that lecturers have to return to their home universities and teach for two years before accepting a new scholarship. In these scholarships, the faculty has to nominate the candidates and selection is often not based on qualifications but on **relations** within the faculty. There are rankings and rules in order to nominate lecturers based on the data hiring of the lecturers and others, but they are not always applied. The desire to gain a postgraduate education is immense and thus, competition is high.

When lecturers return from foreign countries, they describe the different culture of studying and learning. Often they do want to apply these new-experienced **teaching methods**. Individual study is one characteristic that lecturers emphasise, as well as teamwork, especially in computer science where many projects in universities are solved in groups and through teamwork. The applied approach in which students learn through peer-experience and individual study is quite new to the Afghan lecturers. The emphasis to gain an understanding of a topic, rather than reproduction of information, is an issue that lecturers point out when referring to new and modern teaching methods.

Another point that is emphasised by the lecturers is the open atmosphere within the classrooms in foreign countries. Students feel free to ask questions of professors, and professors state that they have to look something up if they do not have the answer to the question. In Afghanistan, lecturers find that they have to defend their knowledge regularly. In particular, when they return with an MSc or Ph.D. degree, students as well as colleagues question their **authority** and try to test their expertise. Lecturers are supposed to know everything in their knowledge domain. The change in teaching methods to a more student-centred, practical and demand-oriented teaching is desired, but remains difficult to achieve and needs time.

One change that has been discussed extensively and is introduced later in more detail when introducing positional maps (see 4.3) is the change to **English**

as a teaching language. The MoHE aims to transform the whole higher education system to use English as the teaching language. The first faculties to implement this are engineering, medicine, law and computer science. At the first stage this means providing material for the students in English, in a later phase, all teaching will be done in English. Computer science faculties began voluntarily to implement these changes and have received compliments for these efforts from the MoHE.

The higher education system is still centred on paper-based communication and approval. To change, request or submit anything, one needs to find superiors to sign it off. Everyone seems very careful with his or her **signature**, as one can be held responsible for something, but it is also an issue of **power** to whom and what you give your signature. Official notes need to be signed by all members of the faculty. One's attendance has to be confirmed with a signature. Lecturers in their hiring process have to get several signatures on their documents, which takes weeks for some signatures.

The **salary** is an important factor for lecturers, as it is very low. The private sector pays far more, and this attracts many away from universities. Many lecturers have part-time jobs. There are several rules that prohibit the taking of another job, but it is also accepted that one has to find other sources of income to provide for a family. Nevertheless, there is often **jealousy** over who is getting which job and how much salary he earns. Lecturers with a good income often face consequences within their work environment. Concerns over income and relative affluence reveal how **private and professional** interests are interrelated.

4.1.1.4 Surrounding Elements

Clarke (2005) stresses the inclusion of other elements that are meaningful in the situation. In the following, the emphasis is on political and economic, sociocultural and symbolic, developmental, academic, temporal, spatial elements as well as major issues and debates. Some of the elements have already been mentioned in the previous sections, as they are closely connected to some actors or actants. The elements are briefly introduced and not discussed in depth.

Elements, which frame the whole situation, are the unstable circumstances in the country. It is far from a **peaceful and secure** place nationwide. These circumstances are temporal and closely connected to developmental elements. Progress and development are visible and is also expressed by many lecturers. The **withdrawal of troops** by the end of 2014 was widely discussed among Afghans. Opinions about the consequences of the withdrawal varied. The presence of the military and the maintenance of their operation is connected to the **presence of foreigners**, this also has economic and political implications. With a withdrawal, many fear that the country will suffer economically and socially. However, unrest and insecurity within the country could be worse, particularly as the economic situation, which is very dependent on donors and foreign assistance, could take a hit. The country is quite **aid-dependent**. With decreasing financial support and less presence of development organisations, the already existing **lack of resources and expertise** will become more severe. Moreover, the elite of the country might leave again if the security situation deteriorates.

The world of foreigners and the world of locals are still much separated and this is a prominent feature of 'development' practice. There is certain **mistrust on both sides** which is very difficult to overcome. Due to a long history of occupations and civil war, trust among Afghans is already not automatic; moreover, there exists a **lack of national identity and unity**. Afghan society is organised in networks, which are built primarily on family networks. With the tremendous amount of development assistance, these family **relations** have been extended and manifested, and **corruption** is common. The overheavy **bureaucracy** combined with the **lack of laws and regulations** makes it difficult to have fair and regulated processes.

In the higher education system, this bureaucracy is felt especially when **scientific** or academic **decisions** are made on an **administrative level**, ignoring the **expertise** of the lecturers. Through these actions, the lecturers feel **unappreciated** and **demotivated**, which often reflects on their performance in lecturing. Lecturers express that they want to leave the job because they feel that their work is not appreciated. They feel that everyone is against each other. They

have to defend their **authority over their knowledge domain**, from students as well as from colleagues. On the administrative side, they have to struggle to demonstrate that their foreign degrees are accepted, that their promotions are legitimised.

Yet lecturers do not discuss their problems with each other, or directly. Problems are instead kept private. The primary task is to **keep everybody happy** and maintain personal **relations** to reach a secure status within the higher education system and society. In particular, a job as a lecturer is a much respected position within Afghan society and is often used for a future political career.

However, some lecturers do not aspire to a political career anymore. Some seek a professional career in IT. Development discourse gave IT an importance so that **IT is seen as key to the economic and social development** of the country. The job market for graduates and for the lecturers is vibrant, as will be seen later and there are diverse opinions about it (see 4.3). Additional income can be secured and this potentially provides a stable and well-respected life for lecturers.

It becomes obvious that there are many conditions and elements that underlie the situation and are often interrelated. Discursive construction can be explained through the elements and *vice versa*. Likewise, actors are influenced by the underlying elements. In order to analyse the situation, the relationships between all these elements are significant. To keep track of these connections, Clarke (2005) introduces relational analysis which is explained in the following section.

4.1.2 Relational Analysis

Based on the creation of situational maps, Clarke (2005) proposes relational analysis as a further analysing tool. Questions can be asked and key elements in the situational map can be related to one another. Due to the permutations and combinations of the relations between the elements, such analysis can reveal fresh and novel links and relations between elements.

By highlighting these relationships, they not only become visible, the process also reveals the quality of these relationships and '*specify the nature of*

the relationship by describing the nature of that line' (Clarke, 2005:102, her emphasis).

For Clarke, these relationships are vital to the understanding of the situation because the situation is constituted through these specific relationships. Grounded in the Chicago School with the basis of understanding the interactive nature of situations by focusing on organisations '*in relation to the sitings or situations of one another, and within their larger contexts*' (Clarke, 2005:41, her emphasis), relational analysis is a tool to unpack these relations and to understand the situation.

As Clarke (2007:377) puts it, relational analyses are not special, 'rather provide a systematic, coherent and potentially provocative way to enter and memo the considerable complexities of a project laid out in a situational map'.

In the following sections, two different cases are presented, whereas Figure 4-4 and Figure 4-5 present the visual representation of the relations (see also 9.2.3).

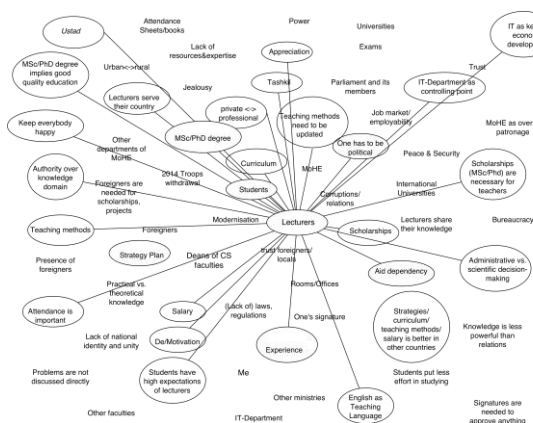


Figure 4-4: Relational analysis: focus on lecturers (see also Appendix 9.2.3)

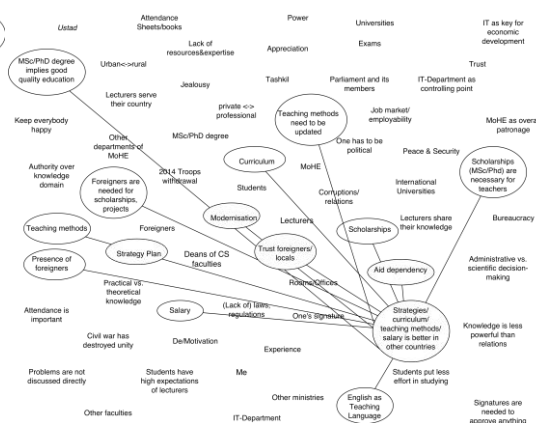


Figure 4-5: Relational analysis: focus on strategies/curriculum/teaching methods/salary is better in other countries (see also Appendix 9.2.3)

Figure 4-4 focuses on the lecturers and what they have to say about other elements in the situational map. Because the lecturers are in the focus and their perspective on computer science is in the centre, there are many elements that are related. The most dominant that kept coming up in the interviews and

observations have been chosen. Being a lecturer, *Ustad*, is associated with **serving the country, sharing the knowledge** they gained to the students. All lecturers highlight this point of their profession. This is not something that is associated with computer science, rather with the profession of lecturer itself. Associated with this being in service for the country, is that **private and professional life is blurring**. Because Afghan society is organised and structured based on **relations** that often stem from family or ethnic backgrounds, **being political** is an important trait for lecturers. Private and professional favours are negotiated with others, and one tries to **keep everybody happy**. Lecturers are very motivated if one talks with them about their personal achievements. They explain how proud they are to serve their people, how they aim to go for post-graduate education in order to serve their country better. **Scholarships** and the need for postgraduate education is a major theme in the MoHE and between the lecturers. By realising the **lack in their own higher education system**, they are certain that, with further education, they can bring high-quality education to Afghan universities. They just require foreign support. They list as their achievements that they are already **teaching in English**, that their graduates are all **finding jobs**, that they are **changing teaching methods** and **updating the curriculum**.

On the other hand, they are highly **demotivated** and feel **unappreciated**. The very low **salary**, the minor influence in **scientific decision** as most are done **administratively** within the MoHE and the **bureaucratic** regulations are themes that concern lecturers. Not only is the centralised structure quite limiting but **students have high expectations** and **put less effort into studying**. However, this attitude can change quickly and on other days they are proudly presenting the achievements and engagement of the students. All this is further analysed in 6.2, when analysing how computer science is taught in the classrooms.

During the data collection, it became apparent that much discussion was about **strategies, curriculum, teaching methods or even the salary in relation to other countries**. The lecturers who have been in foreign countries compared the status of Afghanistan with foreign countries. They always see their experiences abroad as superior in comparison to the state of the education

system in Afghanistan. Those who have not yet studied in foreign countries are eager to go, as they want to profit from the better state of education and research in foreign countries. Lecturers generalise over the various elements such as strategies, curriculum, teaching methods and salary, that they are better outside Afghanistan. Thus, they have been combined into one element here.

Figure 4-5 presents relations and issues connected to the element ***strategies/curriculum/teaching methods/salary is better in other countries***. If one of the elements should be improved or adapted, this would impact several other elements. The relationships are presented. Considering foreign strategies, curricula, teaching methods or salary as better, actors within the higher education world want to bring changes. For example, the MoHE right now promotes **English as the teaching language** throughout the whole higher education sector. Computer science faculties are pioneers in this endeavour. The **presence of foreigners** and their mission to **modernise** and reconstruct Afghanistan play an important role that Afghans want to change or even discard their own way to achieve. Even though most agree that everywhere else is better, they are arguing which strategies, which curriculum and which teaching methods are the best and should be implemented. Experience during their **MSc or Ph.D.** study experience, their work with particular international partners in Afghanistan, all these different experiences contribute to the already existing conflicts which are based on broader situational conditions such as trust, jealousy and competition between faculties and universities.

The development discourse is always present because higher education cannot finance itself and is **dependent on aid**, so foreign ideas, agendas or vision are often adopted, but failed projects, corruption or just bad communication and intercultural insensibility fuel **mistrust between foreigners and locals** and complicate the processes of localisation and internationalisation.

These above examples aim to demonstrate how relational analysis links different elements of the situation together. The figures reveal the complex web of relations. Tracing these relationships and examining the links between elements is key to generating a broad interpretation of the situation. For this

research, a variety of relational analyses has been conducted to gain analytical depth within the data chapters (see Chapters 5 and 6).

4.2 Social World/Arena Maps

The social world/arena maps take a central part in situational analysis. These maps are derived from Strauss' (1978) social world framework, which focuses on actions, activities and values between members of social worlds and the worlds themselves. Strauss (1978) saw these social worlds as 'universes of discourse', originating from Mead's (1934/1962; 1938/1972) concept of interaction. Clarke (2007:363) stresses this and explains further that 'principal affiliative discourses are the mechanisms how people communicate and organize social life'. Thus, the primary focus of the analysis lies in the meso-level, where collective discourse and action take place. In order to gain an understanding of the situation, however, social world/arena maps encourage the analyst to step back and see the situation of interest embedded in a larger framework.

From a distance, the underlying conditions of the situation become apparent. These conditions are key to the understanding of the situation, moreover as Clarke (2005) stresses, they are in the situation itself.

Characteristic of social worlds is that they evolve around the actors and their discourses. Though, as Clarke (2005:124-125) emphasises, "[t]he boundaries of social worlds may crosscut or be more or less contiguous with those of formal organizations" as in Figure 4-6, displayed. The analysis of social worlds can point in the direction of actions, boundary construction processes, discourses produced by social worlds or an intense focus on a particular social world.

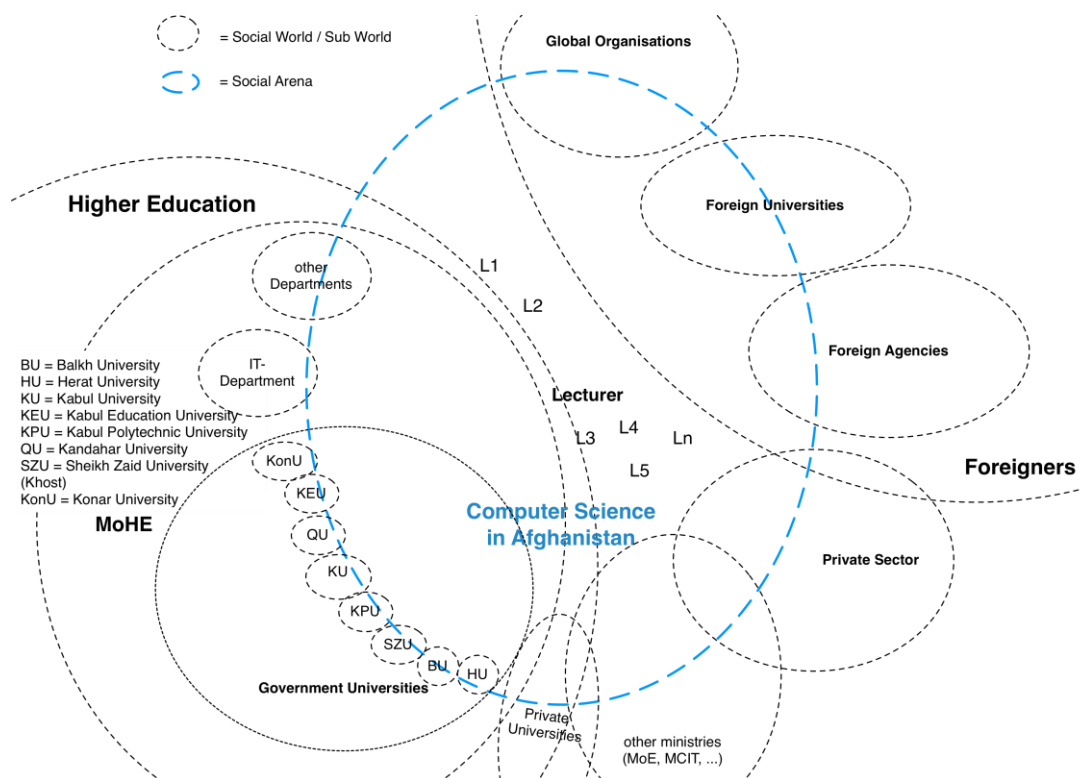


Figure 4-6: Social world and arena map: computer science in Afghanistan

Questions which have been asked in the analysis include: 'What is the work of each world? What are the commitments of a given world? How do its participants believe they should go about fulfilling them? How does the world describe itself – present itself – in its discourse(s)? What are the hot issues/contested topics/current controversies in the arena's discourse' (Clarke, 2005:115) and so on.

Based on these questions, the social worlds/arena map of computer science in Afghanistan has been constructed. The lecturers are located in the centre of the arena because they are the centre of the research, and this research aims to present developments in Afghan computer science from the perspective of the lecturers. They are not presented as collective actors, rather as individual actors in the larger arena, in the middle between the MoHE, the private sector, private universities, foreign universities, global organisations and other foreign agencies. Accessing the situational map helped in the identification of actors – individual or collective - and the construction of the social worlds.

4.2.1 The Higher Education World

The lecturers themselves are part of one of the governmental universities' computer science faculties or departments. In their university, they are presenting computer science developments. They are the ones who teach computer science and who deal with the students. In order to do their job, they have to interact with the **MoHE** and its different departments because by being part of a university, they are part of the MoHE as well. The governmental universities and, consequently, the faculties and the lecturers belong to the MoHE.

The social world/arena map (Figure 4-6) places the MoHE as a larger world within the higher education world, but with several smaller worlds embedded. Within the MoHE, there are various departments which are summarised as **other departments**, as they regulate administrative as well as scientific policies within the higher education system. Lecturers are in contact with them in order to manage their own administrative issues such as payment, promotion, scholarships, research trips or similar, or with other departments to approve their curriculum, the number of students for the next semester or other scientific issues. There is also the **IT department**, which is involved in anything related to IT and CS. The lecturers are familiar with these departments and are in regular contact with them. These constant interactions show how present the MoHE is in the daily life of a lecturer through administrative structures.

Because the **governmental universities** belong to the MoHE, they construct their own social world inside the MoHE. The lecturers belong to a particular university and are very much focused on their own universities. In the diagram, the universities which offer computer science education are captured. There are the three Kabul universities (**KU**, **KPU**, **KEU**) as well as the other universities in Herat (**HU**), Balkh (**BU**), Nangarhar (**NU**), Khost (**SZU**) and Konar (**KonU**) as well the newly established faculty in Qandahar (**QU**). Lecturers from universities in Kabul have, due to spatial distance, more exchanges between each other and are more aware of what is going on in the other universities. Developments and situations in the provincial universities are not very well known. Travelling is often dangerous and expensive, so there is less exchange

between the faculties. While the lecturers from provincial universities visit Kabul, lecturers from Kabul rarely visit other faculties. Most lecturers have not seen other computer science departments or faculties. There are links between lecturers based on working with the same project partner or studying together at a **foreign university**, such as lecturers who trained together at TU Berlin.

Tangential to the social world of the MoHE are the **private universities**. They are independent of the governmental system, yet the MoHE gives accreditation to their degrees and thus they also have to follow some regulations of the MoHE. Many lecturers in governmental universities have part-time jobs in these private universities. As mentioned, due to the limited salary, private universities are attractive employers. As governmental universities have a good reputation, private universities court the lecturers with higher salaries and dean positions. Computer science and IT related courses are very popular in private universities, so developments in computer science in private universities shape what is happening in governmental ones and *vice versa*, with the lecturers as links between these worlds.

4.2.2 The World of Foreigners

A significant influence and effect on the social world of the MoHE and more specifically to the computer science faculties and their lecturers directly are foreigners; this includes **foreign universities**, **foreign agencies** or **global agencies**.

Lecturers seek connections to foreign universities and foreign agencies; the same applies *vice versa*. Both can be seen in a larger social arena of foreigners. Lecturers interact with foreign universities in many different ways. On the one hand, lecturers with an MSc degree have studied at a foreign university in the past, so links already exist. During their stay, they are exposed to a new and different world. Their experiences shape their perception of education in general, as well as their perception of organisation of teaching, teaching methods, the way students and lecturers interact, or how research has been carried out in foreign countries. After returning, they usually highlight the potential of their stay, introducing new discourses into their home universities and to the other

lecturers. Due the limitation of scholarships, these previous experiences and narratives from other lecturers often construct which places are desirable or otherwise for the younger lecturers. Through these discourses, foreign universities are always present, yet more implicitly.

Some foreign universities do not only provide education abroad but also maintain relations and projects at universities in Afghanistan, thus influencing developments more explicitly. This can happen through donations of hardware or other material, through short-term visits of foreign academics or through long-term commitment like university partnerships. Several foreign universities have connections to specific faculties in universities that they are supporting. For example, the establishment of computer science is championed by several universities. The TU Berlin has key faculties which are supported, and the same applies to other foreign universities. Such specific or discipline-wide university-partnerships are not unique to computer science. Moreover, this applies to all disciplines within the Afghan higher education system.

Global agencies such as the World Bank have sent academics for long-term temporary support to Afghan universities in the framework of a large grant scheme. Global or foreign agencies, as the donors of most projects, maintain relations with their partners, and they visit and communicate with the lecturers on a regular basis. As facilitator and donors, their agendas and vision are negotiated with the lecturers constantly. The lecturers in computer science are promising partners, as they are mainly young, educated in foreign countries and are thus inter-culturally competent, with good English communication skills. The lecturers' motivation and commitment to shared goals attracts many foreign agencies and many lecturers try to find foreign donors in order to contribute to the development of their faculties or departments while strengthening their own status within their faculty/department or the MoHE.

International involvement has a huge impact on the situation. The commitments of this world of foreigners are to help in the reconstruction process, with money or expertise. Foreign universities work mostly in collaboration with foreign agencies because funding for university projects is mainly provided by these agencies. There is often a constant communication

between these foreign partners, which is embedded in a larger political framework of (inter)national development assistance towards Afghanistan.

Different agencies and different organisations have diverse working expertise and agendas. While for Afghans the differences are sometimes not visible or not important, there are clear separations in the development practices among foreign agencies. The competencies and spheres of action are marked quite clearly, yet on location these spheres are often overstepped. Afghan university leadership accepts mostly all support that is offered. Due to the lack of resources, denying support seems unacceptable. Managing these projects and their outcomes became a new task for academic leadership as well as for the lecturers.

International and foreign efforts towards computer science education is executed in differently ways. The capacity-building of lecturers through scholarships is one way to support it actively, but also the development of curricula or policies are an influential way to shape lecturers' perspectives and orientations, as well as computer science development as a whole.

4.2.3 The Private Sector

The private sector itself takes an important role, sometimes as a very silent world, sometimes not. With the goal to educate computer scientists for the demands of the labour market, the needs of the private sector are of importance. Yet no survey or study has been conducted to identify these needs.

Many lecturers work in the private sector, or they own their own companies. Their experience in the private sector feeds back into how they would change computer science education so that students can benefit from it.

Students who seek a part-time job during their studies or a permanent job after their graduation understand the demands of the private sector. They see the short-term demand in Afghan's IT market and wish to study more practically oriented courses and fulfil the demands of the private sector. Lecturers emphasise the long-term potential in Afghan's IT market. Foreigners and Afghans even daydream of Afghanistan as a second Bangalore or India. In this picture, the private sector itself is a silent actor and mostly influences the situation implicitly.

On the one hand, students observe what jobs the private sector offers and they demand to study the needed skills. Thereby, the private sector influences the skill-set that should be taught in the degree programmes (see also 6.1.2). On the other hand, lecturers influence the private sector by producing graduates with a specific skill set. Graduates can apply these skills in companies, or they open their own companies and form the private sector by themselves. Especially for computer science education, the main question remains: What is a computer scientist in Afghanistan, and what skills and traits should she or he possess?

4.2.4 Other Ministries

In the social world map, ministries are indicated. One of these is the MCIT. Their IT policy stresses capacity building, hence computer science education. In the actual development of computer science as a discipline, this is a rather inactive world.

The same applies to the MoE; with the enthusiasm in modern technology, the MoE plans to integrate technology in their curriculum for school students in preparation for university. While some of the lecturers are more active in this field, the MoE itself is also an inactive world, as it does not contribute much to the development of the computer science discipline itself.

4.3 Positional Maps

Positional maps are the third tool that Clarke (2005) proposes for implementing situational analysis. Situational maps aim to grasp the macro-level, social world/arena maps the relationships and interactions in the meso-level. With positional maps, Clarke (2005) targets the micro-level. The focus is to visualise the different subjective positions of the different actors. Positions are constantly articulated and can be gathered through interviews or observation throughout the fieldwork period. Often, the positions taken in a discourse are multiple and contradictory about a specific issue. Positional maps help to map out the positions taken in a discourse evenly and do not label or classify the positions as right/wrong or normal/deviant positions. Therefore, Clarke (2005:126) states that positional maps present a 'heterogeneity of positions'.

Fundamental for Clarke (2005:126) is that positions are not related to individuals, groups or institutions. She (2005:127) argues:

‘I am ironically arguing that articulating positions independently of persons, organizations, social worlds, arenas, nonhuman actants and so on allows the research to ultimately, downstream, see *situated positions* better. Contradictions abound and positional maps enable us to see the broader situations, as well as specific positions, better’.

By moving away from the binary positions, thereby enforcing complexities back in the analysis, and by allowing the position to be anonymous and not giving specific actors more value than others, Clarke (2005:127) aims to step outside the ‘politics of representation’. In a situation, which is very familiar in this case of computer science in Afghanistan, where some actors are known for a long period of time, positional maps offer a tool that makes it possible to reflect on the situation more efficiently, so that biases can be avoided.

The following introduces two examples of positional maps that have been produced.

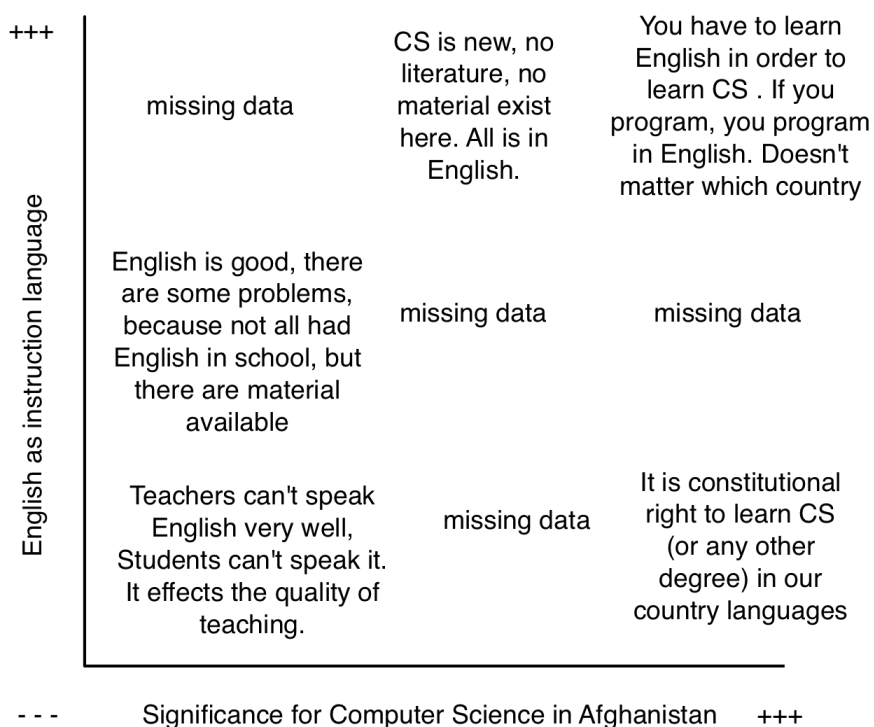


Figure 4-7: Positional map: significance of English as instruction language in computer science

Figure 4-7 presents different opinions of the significance of English as a teaching language in computer science education. There is a strong debate about

whether English as a teaching language should be used in the higher education system in Afghanistan or not. The MoHE has started a pilot project whereby all medicine, engineering and law faculties in the country should switch to English as a teaching language. In conversations, many stated the importance of English in teaching computer science, while in Kabul many lecturers said that they are already teaching in English. After asking further, it became clear that teaching in English meant that English literature is used, that scripts and other material are in English, that exam questions are set in English, but it did not mean that all lectures are given in English. In the beginning, all stated the positive effects of English as teaching language. Only after further enquiry were critical statements expressed. Figure 4-7 is a positional map and represents these opinions. These positional maps do not represent the frequency of occurrence, which can help to reflect also on the own selective perception. In the field, the positive responses were so frequent that one almost overlooked that there were also critical responses. It becomes more visible that several positions are not taken. There are positions that are seeing English as a teaching language to be very beneficial, in particular with regard to computer science. However, there are also opinions that an implementation of English will bring many challenges which are not so much related to computer science, rather to the general policy of teaching in English. Moderate opinions were not taken.

In the next example, (Figure 4-8), the positions of lecturers towards the demand for computer scientists and the employability of computer science graduates are presented. Here, the positions are more even distributed. Different positions are taken.

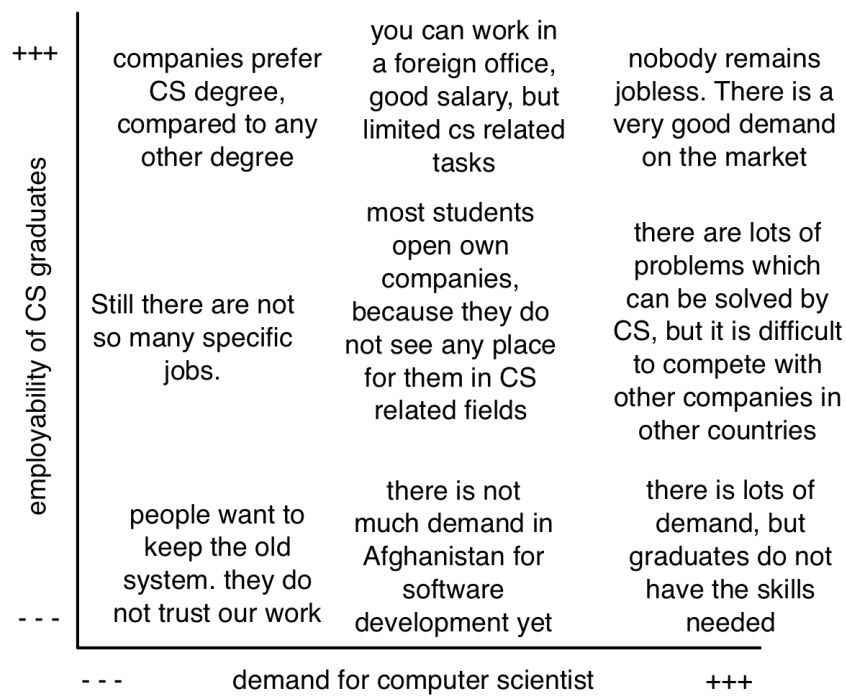


Figure 4-8 Positional map: demand and employability of computer scientists

The lecturers' opinions vary if asked about the demand and the employability of computer science graduates. There are also regional differences, which are not represented here.

On the one hand, most agree that it is not difficult to find employment after studying. Most educated Afghans find jobs straight away. However, as stated by the lecturers, computer science graduates are even more valued on the job market than other graduates. Some do not pursue technical jobs; there are many who work as IT managers, network administrators or IT technicians in local or international organisations. This means that one has to reinstall operating systems (mostly Microsoft Windows), check the Internet connections and do simple troubleshooting in office applications. Some are happy about these job opportunities, but for others, they do not see the learned skills in computer science applicable and search for more challenging job opportunities.

One possibility is the founding of start-up companies. More and more graduates and lecturers go this way in order to escape limited job opportunities. They are seeking their own challenges. Some of them are disappointed, as plans do not work out or people do not trust their skills or they cannot find a market. Others do not yet see a market for software development, but they continue

regardless. Others see the opportunities, but struggle with the competition on the market. Others who work in larger companies see the huge demand for computer scientists, but state that graduates do not have the skills and therefore open positions cannot be occupied.

The different positions show the variety and complexity of the situation. These different perspectives held by the lecturers have further influence on other decisions later on. The design of the curriculum, where questions are important for what skills a computer scientist should have, depends on such perspectives. Lecturers debate whether content should be based on market demands, which would imply a vocational training in IT-related jobs, or if an academic scientific curriculum is more appropriate so that graduates have knowledge and skills comparable to other countries. The complexity and the perspectives of the lecturers are essential in the understanding of the whole situation.

Positional maps contributed to the grounding of the situation because they were not based on frequency of position occurrence nor related to individuals.

4.4 Summary

This chapter has introduced how situational analysis has been conducted for this project. Furthermore, it aimed to present the situation in more depth with the goal of giving some orientation before interpreting the results. Not all findings have been presented and certainly not in complete depth, and not all findings are discussed in the interpretation chapters. Key findings have been selected to answer the research questions. However, an overview of the situation of inquiry has been established in this chapter. By means of situational maps, the macro-level introduced the actor collective, both human and non-human, with its discursive constructions, as well other elements that influence the situation. The different worlds that are active and involved have been introduced and illustrated in a social worlds map. All the different mapping tools have been used to make sense of the situation and build an understanding of the processes in the construction of computer science as an academic discipline.

During the process of the analysis many maps, in particular relational maps and positional maps, were produced which are not presented. The maps

(see Figure 4-3 to Figure 4-8), which are included, are examples and demonstrate the process of analysis.

The whole package of situational analysis offers high flexibility for qualitative research and during the fieldwork period, the insights gained also have been used to bring changes within the scope of the action research project. It has proven to be a useful approach to map the complexity of the situation. The created maps are route maps for the next chapters. Chapters 5 and 6 interpret the findings. Thereby, Chapter 5 relies predominantly on the situational map as well as the social worlds map and focuses on the arena in which computer science developments occur. Chapter 6 explicates the construction of computer science within the faculties and utilises additionally positional maps to present the different perspectives of the lecturers.

5 The Arena of Computer Science Developments

The following highlights what Clarke would phrase the conditions of the situation. She stresses, 'perspective dominates interpretation upon which action is based' (Clarke, 2005:21). Thus, I first present the arena of *Computer Science in Afghanistan* (see Figure 4-6) in order to provide the perspective of the lecturers and how they see their working and living environment. As highlighted before, the perspective, opinions and understandings are important signposts and markers to understand the establishment of the discipline. The lecturers' worlds upon which these perspectives and understandings are based and the subsequent interactions are in focus here.

This chapter utilises the social world and arena map (see Figure 4-6 or 9.2.4) with the lecturers in the centre of the map as they are the focus of the research. They are surrounded by the different worlds of different actors. Additionally, the situational map has been used to construct a broader picture of computer science. The main emphasis is on the interplay of the worlds and the position of the computer science lecturers within it, illustrating and explaining the arena of computer science in Afghanistan before focusing more concretely on the construction of computer science with its practices and interactions. The aim is not to distinguish between internal and surrounding elements or mark one as conditions or context of the situation, because I agree with Clarke's (2005:71, her emphasis) emphasis that '*the conditions **of** the situation are **in** the situation*'. Thus, surrounding elements of a social, political, economic or cultural nature cannot be seen separately from the concrete action later on.

The research sub-questions, *how are computer science lecturers situated in the Afghan higher education system? How do computer science lecturers perceive and understand the role of education and science within Afghanistan?* guide this chapter. Social world/arena analysis within situational analysis is utilised for the purpose of capturing boundary construction or reconstruction in the establishment of computer science in the higher education system. Within the literature of discipline formation, boundary constructions are essential in the

analysis (Clarke, 1998: 20; Gieryn, 1983; Rosenberg, 1976; Shumway and Messer-Davidow, 1991; Strauss, 1978). Clarke (1998:20) highlights the boundaries between science and society, between the disciplines themselves and boundaries within a discipline. In the following, this chapter identifies and marks boundary constructions between education, science and society, between the international community and within the social worlds of the higher education system itself.

The first section of the chapter introduces the arena of computer science in Afghanistan and outlines the situation in which computer science developments take place. It focuses more on the institutionalisation of the discipline and the particular circumstances that contributed so that computer science could find its 'institutional niche' (Lenoir, 1997:61). Thereby, the influences are outlined that support the capability of computer science to become a desired academic discipline (5.1.1). Further, attention is paid to the world of foreigners (5.1.2) and the world of higher education and its internal politics (5.1.3) to stress how separated these worlds are. This is mostly reflected in separate developments of administrative structures and professional development. This section does not focus on the group of lecturers *per se* but rather introduces the arena in which they are placed.

The second section of the chapter focuses more on the lecturers and their social position within the higher education system. The development of computer science in these two separate worlds, as shown in 5.1, challenges the lecturers' role. They act as connecting link between these two worlds and bridge different understandings of being a lecturer (5.2.1). Therein, the group of lecturers is further introduced (5.2.2), along with their challenges to claim authority over their knowledge and expertise (5.2.3).

The two sections aim to complement each other, by focusing first on the whole arena and its links outside and later on the interactions inside the faculties, concentrating on the lecturers. It does not mean that the interactions are isolated, but the two sections intend to highlight these different perspectives. Together they present where computer science developments are occurring and what computer science means within the arena to members of the different worlds. It

aims to give a solid foundation for the next chapter, which more specifically explores the processes and practices in the construction of computer science in the Afghan higher education system.

5.1 Situating/Framing Computer Science Developments

Computer science as a new discipline in Afghanistan is shaped by many factors and is pushed forward by different actors. Chapter 4 introduced the main actors and placed them in the arena in a somewhat descriptive way. The following aims to go beyond that and interprets and situates computer science developments more analytically. Thus, in order to outline the situation in which computer science developments take place, the position of computer science within the higher education system will be elaborated (5.1.1). Computer science gained popularity, because of the emphasis placed on the fact that the discipline would be integral to the reconstruction of the country, and because it is able to connect Afghanistan to the globalised world. Significant is the presence of the international community, which influences the vision and orientation of members of society, but also plays a major role in shaping the vision of a modern higher education system. Thus, the recent reorientation of the higher education system in the post-2001 era contributed to computer science gaining a prominent position.

Subsection 5.1.2 focuses on the arena of foreigners, which not only implicitly influences developments but is also an active arena that shapes the academic discipline itself. Focus is on the interactions and the building and maintaining of relationships with the international counterparts. The section ends with a closer focus on the politics within the MoHE. All developments, ideas, strategies and implementations are legitimised through the MoHE. Thus, the politics are highly significant and are based on a hierarchical social order and a diverse networked structure that is here presented.

5.1.1 Position of Computer Science in the Higher Education System

The history of the higher education system (see 4.1.1) has shown how the political environment influenced the education system, as well as vice versa. Also

Giustozzi (2010a, 2010b) emphasises the relationship between Afghan politics and Afghan (higher) education, and shows how the education system has been consistently disrupted, and has fallen victim to the constantly changing political environment in the last decades. In the post-2001 era, key objectives are the restoration of countrywide security as well as the socio-economic reconstruction of the country. The strengthening of the higher education system became a key objective for the government to counter the existing skill-deficit, as well to produce human capacity for the socio-economic development. In this time, computer science reached high popularity among the Afghan population as well as within the world of higher education. Several lecturers stressed that graduates with a computer science degree are highly favoured on the job market. 'All our students find jobs' (Informal Conversation 19), because 'computer science knowledge is preferred to any other knowledge' (Interview 61). This leads to exploring what position computer science has in the higher education system and how such a position has been constituted. Bourdieu (1988) points out that faculties and disciplines are subject to a hierarchical order. Like any other field or world, the higher education system or the university are fields that reflect the 'structure of the field of power' (Bourdieu, 1988:32). Disciplines are struggling for dominance, and in Bourdieu's terms, depending on what different kinds of capital they possess, they position themselves. At the core of this struggle is the university field and its organisation in two opposing poles that are based on the scientific and social competence of the faculties: the scientific hierarchy with its cultural power through scientific authority and the social hierarchy of economic and political power through inherited capital (Bourdieu, 1988:48). This means that faculties are ordered by how influential they are in the society and how influential they are in science.

Over the last few years, computer science advanced from a study degree that was an unpopular choice for students in the beginning to one of the most desirable and popular degree programmes within the country. Computer science was able to establish a strong position within the higher education system. There are two main reasons for the positive image and its popularity right now. Externally, the introduction of information technology helped the discipline to

strengthen its position through the fast spread of information technology. The discipline's role in the reconstruction process is significant and demonstrates computer science's influence in society and the social world. Internally, the reorientation of higher education and the modernisation of the system through information technology, along with the affirmation by foreigners of the importance of information technology and computer science helped it to a strong position in the scientific world. The external, as well as internal developments, are co-dependent on each other, meaning that the emphasis in the outer social world leads to a focus on the scientific world, and *vice versa*. The emphasis within the higher education system, meaning the scientific world, leads to more local expertise in the area of information technology and more attention in society, the social world. On the other hand, the attention to information technology makes students decide on a computer science degree and so strengthens the position within the higher education system.

To begin with, the introduction of information technology is elaborated further with regard to its impact on society, followed by a description of the current reorientation of the higher education system in respect of the higher education world. Computer science could establish itself very well in both of these worlds, whereas the scientific world is not distinctive yet. This indicates that struggles predominantly take place to gain authority within the social hierarchy. The low status of scientific authority within the higher education world led to the assumption that economic and political power are very decisive and determine the social hierarchy, and how disciplines position themselves in the higher education system. The following illustrates the thin boundary between science and society and identifies that the social is very present in the interactions within the higher education system.

The limited access to technology during the years of conflict in Afghan history, plus the position of the Taliban towards technology, had its impact on society. Afghan people felt cut off and isolated from any development. The lack and absence of technology created an environment where technology was appreciated and desired in the post-2001 era. Lecturers describe their first contact with computers as special and extraordinary. Computers were objects

that were new in their world, sometimes computers were secretly held in the house due to the ban on technology during Taliban times. This secrecy and the novelty spurred their curiosity to learn more about computers (Informal Conversation 43). In 2005, students were wearing USB sticks around their necks as a status symbol for being young and modern and up to date. Today, the students and lecturers express their technical affinity through stickers on their laptops or new mobile phones or similar devices. Technology and science developed to become symbols of modernity and development and, most of all, to become symbols of change.

Information technology distributed fast within the society. Rogers' (1995) framework of diffusions of innovation can help to understand the very rapid diffusion of technology in Afghanistan. While computer or other technological devices are not innovations if globally viewed, they coincide with the concept of 'an idea, practice or object that is perceived as new' (Rogers, 1995:11). With the aim of seeing how innovation spreads over time to members of a social system, the framework identifies the diffusion as a continuous process, where the members decide when and how to accept and adopt the innovation (Rogers, 1995:12). An s-curve characterises the diffusion where an innovation starts slowly through early adopters functioning as opinion leaders, followed by early majority, late majority and laggards. The urban elite functioned as early adopters, but returning expatriates and foreigners who were importing and using technology more naturally had a huge influence on the diffusion. Personal information technology like mobile phones, laptops and the Internet enables people to access and distribute information quickly. This is ideal for the maintenance of the web of relationships upon which Afghan society is based. These personal technologies could penetrate the country successfully, and today the majority of the country has access to telecommunication.

Interestingly, the diffusion of professional usage of information technology is much slower. Lecturers point out 'there is no trust in applications, we trust the paper' (Informal Conversation 14). Technology becomes visible in governmental offices as well as in the private sector, but there is only a slow progress in professional usage beyond standard office applications. There are a variety of

reasons for this. There is the lack of local expertise to develop and implement advanced information systems as well as limited knowledge on how to use advanced information systems. However, other reasons hinder the fast adoption of professional information technology. Often, the introduction of systems is a rather political process, where issues about control and power over responsibilities and influence are decisive. Nevertheless, the use of information technology is reinforced by foreign direct investment and development cooperation. These actors emphasise the importance of information technology in the reconstruction process. This leads to a demand for information technology expertise. The computer science degree is the certified knowledge of such expertise. Thus, the need for technological expertise within society gives attention and recognition to the discipline.

The *konkur* exam, the entry requirement exam for universities, acts somehow like a barometer of public opinion of the popularity of a discipline within society. Students have to indicate their choice for a study degree during the exam. Based on their achieved marks and their selected study degree choice, students are distributed to the places available. If the choice is popular, higher marks are needed to secure a place to study. Students' selection for a study degree is primarily based on the goal to find a degree to ensure economic well-being for the family rather than personal scientific curiosity or choice. Thus, the demand for a study degree reflects the high social responsibility of a discipline within society. Bourdieu (1988) emphasises that this social competence affects the order among the disciplines. As elaborated earlier, the discipline could gain recognition within society. The availability of personal and professional information technology provides many opportunities for graduates, which leads to a demand for the degree programme. This gives computer science a prominent position among other disciplines. Other disciplines that are highly ranked through the *konkur* exam are medicine, law, and engineering, followed by computer science. All of these disciplines reflect an important function in the reconstruction process.

The constant struggle for the best position within the higher education system is not only determined by its influence in society. Bourdieu (1988)

stresses that opposed to this is the struggle to gain scientific authority and competence among the other disciplines. The scientific hierarchy of disciplines in the Afghan higher education system is hard to determine. Because of the destruction of the higher education system, there are not many scientific activities. It is difficult to perceive scientific struggles between faculties or disciplines as they are not yet very distinctive. Furthermore, as already mentioned, the low status of scientific authority results in an emphasis on social authority. In the following section, the history of the higher education system is shortly introduced as well as how computer science could still position itself.

The higher education system has suffered severely in the past. In the 1960s during a wave of modernisation reforms, higher education was highly prioritised and in 1969, up to 43.6% of the education budget was directed towards higher education (Giustozzi, 2010b). During this time, the higher education system was comparable with other regional higher education systems and in a state which older lecturers and others still nostalgically recall (Azizi, 2008; Babury and Hayward, 2014; Giustozzi, 2010b; Informal Conversation 14). However, since the Soviet occupation from 1978 onwards, a decline can be traced. Education was used as an instrument to disable ruling elites, but at the same time stirred up conservative and nationalistic movements. The results were ongoing conflicts that damaged the whole education system. Babury and Hayward (2014) describe a massive politicisation of the higher education system that led to the escape or even persecution and imprisonment of faculty and staff. The following civil war and the Taliban regime destroyed the higher education system.

Thus, in the post-2001 era, the primary task was the reconstruction of the higher education system. Offe (in Davies, 2004) observes two trends after a conflict: modernisation and conservation ideologies. While modernisers see the future of the country in urban life, civil society, market economy and human rights, for example, the conservatives see it in recollecting and rediscovering religion, national pride and traditional values. Azizi (2008) has interviewed Afghan educational leaders and confirms Davies' (2004:167) assertion that education officials desire 'a fresh organizational reality which was economically sound and rationally structured'. With new educational reforms, educational

leaders aim to create distance from the previous regime and political systems (Buckland, 2005; Davies, 2004). What followed was an analysis of the old system and a debate on the objectives of the higher education system. In order to have a fresh start, the higher education system was going to be (re)orientated to new ideas and strategies. This emerged as a very challenging task because of the different education systems in the past, a returning elite, a non-existing elite within the country and a physically as well as intellectually destroyed higher education system. A variety of actors, many ideas, orientations and agendas needed to be mediated and it is these in collaboration with international organisations that are funding the reconstruction.

In order to enable trust in a new emerging society, the government stressed education and its benefits for ensuring socio-economic security within Afghan society. With such emphasis to ensure socio-economic development and the well-being of the people of Afghanistan, the MoHE aims to 'transform it [the higher education system] into a modern, merit-based system that is once again one of the best in South Asia, as had been the case before the Russian invasion, as well as one that meets international standards, making it competitive with other systems in the region' (Babury and Hayward, 2014:1). In reaching such goals, the government has to rely on international development cooperation. For global and international actors, higher education takes a significant role in the economic development of a country. The importance of high-quality knowledge and its impact on the country's economy and its national competitiveness has been stressed repeatedly (TFHE, 2000; World Bank, 1999). The National Higher Education Strategy Plan (NHESP) picks up this point and emphasises that 'no nation moves into the realm of developing economies without a high quality education system. The key to economic development is the quality of the higher education system' (MoHE, 2009:4). The importance of knowledge within the higher education system stems from the concept of a knowledge-based economy that is in place globally and to which Afghanistan wants to integrate. In order to be part of that global economy, the production, dissemination and use of knowledge and information must be in the focus of the higher education system (OECD, 1996).

Such reorientation of the education system leads to an emphasis on the supply of information technology as a core infrastructure for carrying information. Consequently, there is a high emphasis on providing and using information technology services for administration as well as for teaching. Due to the destruction in the previous years, everything is built from scratch. There are initiatives to provide high-speed Internet, to establish PC pools and to develop information systems for administration or university websites. Even smaller intentions such as the provision of printers or projectors, the use of PowerPoint slides in the lecture or training in Microsoft Office literary skills in general are implemented. All these activities are heavily supported by international actors (see 5.1.2). Because international actors provide resources and stress the importance within the reconstruction process, the leadership within the MoHE and the universities are eager to implement information technology projects.

In addition, the transformation of the higher education system to a merit-based system has consequences in the higher education world and for the position of computer science within this world. The importance of high quality education and the emphasis on knowledge production have led to set goals in cooperation with international actors which focus on faculty development, curriculum development and upgrading, and faculty research (Babury and Hayward, 2014; MoHE, 2009). In the implementation of these goals, computer science benefits from good preconditions. Because of the destruction of the higher education system and the novelty of computers, the discipline had to be established almost from scratch in the post-2001 era. Physical infrastructure was not available, but there were also no administrative structures. In strategy and budget plans of the MoHE, computer science faculties were not budgeted for. Kabul University was severely damaged and at the other universities, there were no buildings available and not even planned for. Furthermore, there was no approved curriculum developed, nor teaching material or lecturing capacity. However, because of its social relevance and the transformational character of information technology, the international community encouraged the

establishment of computer science. The establishment of computer science has been academically as well as financially supported.

In particular, the promotion and support of students and young academics were and still are a core activity. The international community sponsored exchange programmes and scholarships for postgraduates as well as undergraduate studies abroad. The project of the TU Berlin, in which I was involved is one of the major providers of capacity building programmes. Based on funding schemes such as the Strengthening Higher Education Program (SHEP) of the World Bank, the focus was on the six core universities, Kabul University, Kabul Polytechnic, Herat, Balkh, Nangahar and Qandahar University. Lecturers from Kabul Education University, or Khost, Konar and other universities who want to open computer science faculties complain that their institute and provinces are forgotten and deprived of development resources. At the six core universities, foreign lecturers were employed for short-term teaching until graduates of their own faculties could be hired. The pre-conditions were ideal to strengthen the scientific capacity quickly. In other disciplines, scientific capacity is often limited through older lecturers with out-dated knowledge. However, in computer science, predominately young, newly qualified lecturers could be hired. Further, PC pools and teaching materials could be transferred from foreign countries so that the faculties could be equipped with the newest material. Because of the non-existence of computer science before, nothing needed to be adapted to already existing structures.

To summarise, the position of computer science as a discipline is constantly moving. The increasing popularity of information technology brought additional recognition for the discipline and a proper position within society. However, the change towards a merit-based system has its advantages and could place computer science favourably in the scientific world.

5.1.2 The Influence of International Development

Developments within the arena of computer science can only be understood when including the international community. The following aims to analyse the processes of international development between the world of foreigners – global

organisations, foreign universities and foreign agencies (see also 4.2.2.) – and the lecturers and the Afghan partners. Further, it aims to discuss how lecturers negotiate their positions in the process of establishing computer science and the challenges they face. Lecturers are aware that any development of computer science depends on international support. While lecturers' visions of computer science differ, they all agree that it needs international support as it is an international discipline.

Both worlds are dependent on each other, with a shared mission to support the reconstruction process. Yet they are also very separate worlds, which often makes it hard to describe and analyse the processes and relationships, as they are complex and often contradicting. The international community seeks cooperation with Afghan partners, but lecturers also want to contribute to the development of their faculties and higher education system, thus they seek and are reliant on international support. With the objective of strengthening computer science faculties, the boundary objects which bring both worlds together are the donations of the international community. This includes the infrastructure, the donation of technology, of books, the awarding of scholarships or similar. The relationship between foreigners and the lecturers revolves around these boundary objects. As Fox (2011) describes, 'boundary objects are entities that enhance the capacity of an idea, theory or practice to translate across culturally defined boundaries'. In the case of international cooperation in Afghanistan, boundary objects do not just bridge culturally defined boundaries. Furthermore, they bring the two physically separated worlds of internationals and locals together⁶. These boundary objects strengthen the establishment of the discipline in the form of capacity building (e.g. scholarships, training) or access

⁶ The worlds are physical separated due to high security restrictions for development workers. Accommodation, restaurants, transport and other things are separated. Locals cannot stay in international guesthouses, cannot enter international restaurants and are often not allowed to use the same car. While internationals are allowed to use Afghan facilities, the security restrictions do not allow them to overnight in local guesthouses, eat in local restaurants or ride in private cars. Except at the workplace or on the project site, there is little interaction between them.

to technology (e.g. hardware, software, electricity) or providing access to information (e.g. Internet connection, books), for example.

These boundary objects have a generally shared meaning, but might be interpreted flexibly by different users (Bowker and Star, 1999:297; Star and Griesemer, 1989). The establishment of PC pools is a very popular donation, for example. PC pools allow students to do their homework, use the Internet, thus helping them in their studies and learning transferable skills as well as exploring the possibilities of technologies. All agree that a PC pool is a very useful facility, but there are different motivations for everyone. For donors, it is a visible project for providing access to technology so that students can do research and benefit from the connection to the global information society. Yet for students it is primarily a resource to use Facebook, YouTube and other Internet sites where they can find curiosities to share with their friends. For lecturers or the university, it means the status and recognition of being in charge of a running a PC pool among other lecturers. For the MoHE, it is a further increase in their statistics to give all universities access to PCs and the Internet. All in all, the object is adapted to each world individually and interpreted flexibly by different social worlds.

The relationship between the worlds is predominately defined by the transfer of boundary objects from one world to the other. These boundary objects are often in the imagination in the world of Afghans in the higher education system; there is curiosity, hope, expectations linked to these objects (Interview 38; Interview 46; Interview 51). For example, receipt of a scholarship opens new perspectives and would let the lecturers enter a world they cannot but dream about beforehand. In the world of internationals, the boundary objects are concepts or models with a clear image and output associated with them. International development in its implementation is often not visionary, more likely a modification of long-used concepts. Lecturers will be sent to Germany, will get a postgraduate education and transfer knowledge back to the higher education system. During project implementation such boundary objects materialise, they become real entities and are transferred to Afghan reality.

Bowker and Star (1999:298) highlight the importance of action and use in the development of an object as well as the importance of the naturalisation of objects through continuous action. Latour (1987) states that objects become natural in a social world, losing the memory and initial purpose of its origins through time and continuous and regular action. As the boundary objects are much more familiar and natural to internationals and rather new or imaginary to Afghans, and additionally do not affect foreigners in the long-term, unlike in Afghan life, the relationship is unbalanced and sensitive. The following example illuminates the different practices in this relationship. It is pre-programmed that challenges arise and conflicts emerge due to the different understandings and expectations of such transfer. Subsequently, this 'lead[s] to discontinuity in action or interaction' (Akkermann and Bakker, 2011) and makes the boundaries of the different worlds more visible.

In a conversation with another foreign university academic on a fact-finding mission who was just visiting a department, he criticised the lack of strategic planning of the department and the demand of the local staff for more laboratories and scholarships as simplistic and not sustainable. Further, he argued that analysis and strategic planning are immediately needed and more specialised requests should be made after careful reasoning. He reasoned that the international community will not stay forever, that there is a maximum of five years of financial support, and the Afghan partners should act now. For him, it was important that Afghans have a plan and can articulate their demands so that his university can deal with requests such as transferring laboratory equipment to Afghanistan. Such conversations highlight the importance of the outcome and present a specific kind of method used in development practice. At the same time, they give a picture of Afghans as uninformed and passive, yet demanding, recipients.

There are demands on the Afghan side, but they are not as passive as foreigners often interpret. Afghan partners expect to be involved in the whole process. An informed and accurate assessment is often not made, yet the process of how development projects are implemented from its start to the end is highly influential to the perception of a successful project. The end product, be it the

delivered books, the established PC pool, the provided Internet connection or similar are, of course, important, but the usage and acceptance of the outcomes of these projects is highly dependent on how the cooperation process went. By giving or denying their compliance and approval, the local project partners influence others' perceptions and opinions on whether it is a good or a bad project and thus determine its future usage.

The different perspectives of what comprises a successful project affect the relationship and the practices around the crossing of boundary objects from the world of foreigners to the local university world. With the objective to run a successful project, for foreigners the importance is in the analysis, needs assessment and implementation of the proposed and promised solution. For Afghans, a successful project is based on their involvement, control, decision-making and responsibility within the project during the whole implementation period. The course of action and development of the project is far more important than the actual outcome (own observation). While development practice incorporates approaches such as participation, as Kothari (2005:441) stresses, the processes are still not transparent and '[t]he very act of inclusion, of being drawn in as a participant, can perform the exercise of power and control over an individual.' Who includes whom and why? Such questions lead again back to different practices and culturally bound reasoning.

Afghan society is based on a web of relations, kinship, friendship or other relationships (Barfield, 2010; Giustozzi, 2010a; Monsutti, 2013; Schetter, 2013). The social interaction and maintenance of this web of relations is important for one's position within society. The implementation of projects offers the possibility to maintain, or extend one's relationships and to demonstrate power and influence. Being a part and being informed of a project is seen as a matter of respect as well as acknowledgement of one's position. During project implementation, members can demonstrate the scope of their own relationships and gain recognition for their influence, which is very decisive for the outcome later on. To begin with, almost everyone offers you their help. They state that they have connections and that they would use their connections to help to accelerate the process of the project. The difficulty is to balance the reasons behind who and

how people are getting involved. As everyone has their own web of relationships and agenda, it requires an insight into these webs of relationships. Refusing to use the connections is seen as a matter of disrespect or distrust, because denying someone's assistance means mostly accepting the connections of another. By using the connection, one is acknowledging their influence at the same time. Also, one gets part of the web of relationships, which means that one can use these relationships in future, but this also applies in return. By accepting one's connection, it is implied that they can use the connections as well. Central to this process is building and maintaining reciprocal relationships. In the end, these relationships determine the success of a project. The focus is on the whole process rather the outcome. Through the acknowledgement of influential people, projects are accepted.

The continuous involvement of crucial supporters of the project eases the transfer of boundary objects and lays the foundation for a smooth naturalisation and assimilation process. One lecturer gave the advice, 'involve all from the beginning. If you face problems and did not involve them, they will tell you later that they could have prevented the problems or solve the problem in minutes, but then it is too late, you will have to wait forever' (Informal Conversation 42). This also means that it is beneficial, even crucial, to know the Afghan social structure, hierarchy and internal politics, which are in parts difficult to understand or inaccessible to foreigners.

Young lecturers are put into a critical situation when foreigners do not follow these unwritten rules. Young computer science lecturers are popular project partners, as they are motivated, English-speaking and many have already had contact with foreign countries and can adapt to the situation. They function as ideal translators in the boundary-crossing process. During foreign visits or studies, they could gain experiences and understanding of Western culture, and they learned about foreign practices and can easily negotiate with foreigners. However, as new members of the higher education system they do not possess the political power to decide. If foreigners put their emphasis on the younger generation, foreigners indirectly build new networks and disregard the influence and social position of the political leadership. A reaction of the political

leaderships is to demonstrate their power continuously by impeding processes and shifting all processes to the social world, over which they have more influence. At the same time, they play down scientific authority and issues so that younger lecturers have to claim their authority on a constant basis (see also 5.2.3). In regard to the young lecturers, breaking the hierarchy and social order often puts them in a critical space within the internal politics.

The local world with its internal politics and the world of foreigners with their external support are kept quite separate; this means that the administrative structures of computer science are quite separate from the professional development of the discipline. The boundary objects bring both worlds together along with these two structures. The lecturers are between these two worlds, which makes it difficult for them to negotiate their position. To gain authority over the domain of computer science, they have to establish a strong local/internal network (see in detail 5.1.3) though, in order to establish and develop the discipline, they seek cooperation with Western partners. They are the first contact points for foreigners and their superiors within the faculties. Because knowledge and technology transfer is not a smooth process and projects can fail, especially in situations where both worlds are so separate, complications and failures are inevitable. In this case, the lecturers are the first who are approached from both sides.

PC pools have been established without spare parts available in the country, server systems are unused because the electricity system cannot supply stable voltage or curricula are copied with contents that lecturer cannot teach or students cannot comprehend. Lecturers as the connection between the two worlds are attacked from both sides. Due to the only temporary presence of foreigners, conflicts are transmitted primarily between the lecturers and their superior structures. The younger lecturers often stated that they felt alone and unprepared for this situation. Distrust in the relationship with foreigners arises, which leads to a more difficult transfer of these boundary objects, thus more distrust in the cooperation. Yet the knowledge or expertise of foreigners is not in question. Distrust or mistrust is projected to the practices in the transfer of boundary objects and towards the particular organisation or the individual.

There are complaints that practices are inadequate, motivated by money, lacking cultural appropriateness or similar.

The influence of international development is strong, as computer science is seen as Western discipline and as such foreign knowledge and expertise is sought by foreign counterparts. In particular, lecturers who have experienced other education systems are eager to transform their education system but are even more restricted in their actions, because they have to act according to the values and practices of Afghanistan, their local world. Due to the separated worlds of locals and foreigners, boundaries are quite constant and even manifest through the discontinuities of action, meaning the difficulties in project implementation. Yet practices through the lecturers as translators and mediators in this boundary-crossing process are often changed, in particular when they are not linked to administrative structures and internal politics.

The influence of foreign people and organisations, can also be seen in the desire of young lecturers to develop strong networks with them. It can help to get contacts, to get a link to the international world yet, if one wants to stay in Afghanistan and work in Afghanistan, foreigners are not that interesting. They have financial influence but do not possess any political capital that could be of use. One of the lecturers said: 'I don't think foreigners can provide us relations, but you go with others together for your master, like us in Berlin, we were not friends, but three years later we are' (Informal Conversation 43). The politics of higher education are based on such networks, as discussed in the next section.

5.1.3 The Politics in Higher Education

In the establishment of computer science or any other academic discipline, the MoHE is a focal point. As central authority, the MoHE provides legitimacy to any developments or changes within the higher education system. Thus, understanding procedures and processes or daily life within the MoHE are essential to make sense of the politics within the world of higher education as well as the role of the lecturers. In particular, due to the (re)orientation and reconstruction of the higher education system norms, practices and processes must be newly constructed and the consequences of this are constant struggles

over who has authority in the reorientation, as well as the reconstruction process. These constant struggles are examples of power and boundary construction.

In this section, the interaction within the world of higher education is described, and this interaction is extended on to how non-human things are also influencing how practices and norms are built and how they are affecting the establishment of the discipline as a whole. Identifying these interactions should help in locating the social position of the lecturers and their role in the politics of higher education. Social position is a meaningful indicator of the ability to act and the influence of the lecturers within their social space or social arena, in this case, the higher education system. This is instrumental later on, when discussion is more concretely on how computer science is constructed.

In order to analyse lecturers' position and their influence in boundary (re)construction, Bourdieu's (1975; 1985; 1988) field and capital theory has been utilised. The social space is in Bourdieu's (1975; 1985) terms a multi-dimensional space in which actors are positioned. This is akin to Clarke's (2005) understanding of multi-positionality in different worlds. The understanding of fields, where individuals enter with a set of dispositions, get dispositions imposed or learn dispositions is similar to the understanding of the ecologies of groups where individuals are member of different worlds and where members of these different worlds constitute, share or adopt specific attributes and characteristics. Fields in Bourdieu's terms or worlds in Clarke's terms are the places where individuals and groups meet. It is there where negotiations and struggles take place. Fields, in Bourdieu's understanding, come into existence when the capital of individuals is most active, likewise worlds come into existence in Clarke's understanding when commitments, ideologies and discourses are dominant. In both concepts, practice and action are key. In both cases, it leads to struggles around power and boundary (re)construction.

Up until now, the MoHE has been mostly described as a uniform actor, yet the MoHE is divided into many departments, each with its individual actors, in which the individuals, as well as the departments, struggle for influence and dominance within the higher education system. There are disputes between the different departments, but also between the departments and the governmental

universities. With the focus on computer science developments, in particular, the struggles around administrative and scientific decision-making can be observed. Administrative decisions of the MoHE can undermine scientific competence of universities, faculties and departments and they affect the practices of lecturers and students. The MoHE possesses administrative decision-making power as the implementer of laws and regulations. In return, universities aim to influence changes and transformations within the institutional framework of the MoHE through their scientific competence. The MoHE aims to standardise the structures and contents of computer science education. At the same time, universities urge that their scientific competence is recognised, prioritised and implemented. Through competition and cooperation among them, universities aim to reach their goals and to enhance their social position within the higher education system. This is discussed in more detail in 6.1.2 where the processes around the establishment of a unified curriculum of computer science is discussed.

Enhancing one's social position within the world of higher education is in all individuals' interests. The social position of individuals, as well as of departments, faculties or universities, is highly influential on ongoing processes in this world. The better the social position is, the more power and influence one has in defining and shaping values, norms and practices in the higher education world. The social position is an accumulation of all different positions in different fields or worlds (Bourdieu, 1985). As mentioned earlier, Afghan society is based on a complex and dynamic web of relationships. The web of relationships links diverse social worlds as well as creating social worlds and building a network between them. Different worlds have been identified as being important for the development of computer science, but actors possess ever far-ranging and diverse relationships and thus build diverse networks. The personal networks of the members within higher education are a set of relationships which range from family and kinship, ethnicity and language, professional work or political orientation, thus holding social, economic, political and cultural capital (Bourdieu, 1985; Lenoir, 1997).

The hiring process of lecturers illustrates, for example, how important is the social capital of individuals. The processes of hiring a new lecturer are well defined. The demand will be measured by the MoHE and resources will be allocated, a post will be announced and candidates with the needed requirements can show their interest. An interview and standardised tests decide if requirements and quality are fulfilled. The selected candidate teaches for one year on probation without a salary, meanwhile he collects his documents and hands them to the MoHE. Yet most lecturers state that the reality is different, and the process is very arbitrary. For some of the lecturers, they await their approval for years, their documents are regularly rejected with a note to formal errors, but for others, they were hired and suddenly stood in the faculty. For some, exceptions have been made, in some cases even interviews and tests were asked to be manipulated or have been manipulated (Informal Conversation 6). In conversations with lecturers, often the frustration of the hiring processes comes to a fore.

Me: Are you officially a lecturer yet? I remember your process was so much delayed.

Lecturer: I transformed into a person who always complains nowadays. Now you are my next recipient. No, I am not enrolled. Nothing happened yet.

Me: Really? I am sorry to hear that, what about your colleague?

Lecturer: The same for him. When there is a job to do, we are lecturers. But when it is a facility to use, we are not official lecturers. This is.... To be honest, I am looking for a chance to leave the university. I have a job interview, but at the same time I have a few more months to work for the university (because of the scholarship). That makes me wait a bit more. Imagine, some of my students are lecturers and will be head of the department, yet I am not official lecturer!

Me: So somebody doesn't want that you will be an official lecturer. Who?

Lecturer: [laughing], they are a team. It is those who helped absent lecturers to get salary, even they are abroad. We should better leave the topic, it is depressing.

Me: I am really sorry. I can understand it, I also got tired about the political work here.

Lecturer: It should be about scientific development not about personal interests. Lecturers who left the faculty think over the last two to three years nothing has changed. If I get the opportunity to join a job, I will leave. I am still unofficial. But when I say I want to leave

they say 'you have to work 2 years for us'. Then I say, 'let me start the 2 years'. But then they say 'you have to wait'. I have waited now one and a half years after my graduation of my masters. And I started the process of being a lecturers even before going. I asked for help in this process, but nobody supports me. Lecturer X is so powerful right now, everybody obeys him. My lectures are great, I love my job, but sometimes some factors are crazily worrying me. In particular money. Imagine after seven years, not even a penny.

(Interview 69)

Many lecturers complain about the lack of appreciation and the challenges they face when it comes to administrative procedures. The seemingly arbitrary processes are not arbitrary at all. On the one hand, there is a demonstration of power between the MoHE and its universities, referring to the struggle between administrative and scientific dominance (Lenoir, 1997; Abbot, 2001; Bourdieu, 1988). Administrative tasks or requests across institutional borders are received, but not handled, or if they are then very slowly. Often processes and decisions are based on individual judgement and personal relationships, where economic capital is important in the form of financial corruption or where social capital is important in the form of group membership or influential social ties or a combination of both.

The weak institutional framework enables the network structure to provide a strong structure for dominant and well-networked individuals and groups and at the same time a quite fragile structure for dominated individuals and groups. In combination with the very hierarchical social order, the immobility and stagnation of interests and processes is inevitable.

Within such processes, the position of the computer science lecturers is fragile. Everyone relies on a different web of relationships and can revert to their own social capital, but there are certain characteristics that impede the participation and impact of the group of computer science lecturers within the politics of higher education. The hierarchical social order, which is often based on dispositions such as age, ethnicity and gender is of no avail, in particular in combination with cultural norms that elders have to be respected, that specific ethnicities or males are superior. The lecturers are quite a young cohort who

cannot position themselves well in the same worlds. Positions have manifested over time and the older generation had simply over the span of time had the opportunity to maintain, diversify and consolidate their relationships and position within these worlds. Having a diverse network is advantageous and needed in order to maintain the social hierarchy. Moreover, the stronger and higher one is positioned within the social hierarchy, the more crucial is a diverse web of relationships (Lin, 2001).

The main reason for the accumulation of social capital with various strategies is the distrust in others. Only a strong web of relationships can secure one's position in a seemingly arbitrary world. As mentioned, in addition to the networked structure of the higher education system, society is very hierarchically structured in Afghanistan. Hierarchical structures and diverse personal webs of relationships in combination with distrust create a very sensible and at the same time very rigid structure.

The networks are not controlled by human interaction only, as dominance and authority are also exercised and reproduced through non-human interaction. Latour's (1987) actor-network theory, stresses that non-human actants also contain agency and can influence the interaction similar to human actors. Within the overly bureaucratised administration, the higher education system is very much based on paper-based interaction. Everything is documented, and any processes are tedious and require the acknowledgment of many individuals or departments. These acknowledgements are legitimised through signatures on documents. Because of the strong distrust in others, everyone is protecting, validating and legitimising one's actions with documents and letters. These letters, called *maktub* (in Dari: مکتوب), take a significant role. These documents contain much more value than boundary objects; they do not only bring worlds and individuals together, they actually hold collective strategies and ultimately confirm and legitimise action and practices.

The whole Afghan administration is characterised by the high emphasis on paper-based documentation. Any announcement, for example, when exams are taking place, how parking regulations changed, invitations for meetings or any

validation of documents has to be acknowledged and confirmed by signature and sometimes even stamps.

There are different strategies on how to legitimise action. Primarily, the content is important and it will be thoroughly checked for who sent it, the nature of the request and the subject matter. The cautious approach is based on the mistrust in others, but also mistrust of the authenticity of documents is existent, because of the weak institutional framework and the commonality of corruption. Further, the request will be evaluated along with what consequences it might have, as well as who needs to approve it and who has already agreed to it. Based on this evaluation, strategies to sign, not to sign or wait will be decided. Because of the mistrust in individuals as well as institutions, in general, no one wants to document or sign anything. Thus, waiting is the first strategy, which most prefer to do, while evaluating one's options. On the one hand, making others wait demonstrates one's power within the process, on the other hand, it avoids taking a decision and postpones to see what others do and so share the responsibility. However, it also can have negative consequences, as one can draw annoyance to oneself if processes are delayed. The outcome of one's decision is dependent on their own position as well the position of others within the world and the relationships to which everyone can revert.

Referring back to conversation with the lecturer about his process to get an official *tashkil* position shows how important these relations are. He waited almost seven years for the official appointment as a lecturer. The result was that he worked without official payment or confirmation of an official *tashkil* position. At the same time, he had no chance to leave the university, because he had to teach as part of the scholarship he received. He submitted the required paperwork to the university, which came back with excuses that there was no free position at that time, or that a signature from someone was missing or outdated. Over the years procedures and persons have changed, and he had to begin the process from the beginning several times. The fact that his students could secure an official *tashkil* position in the meantime shows that there are people who actively tried to prevent his hiring. Not necessarily the people who need to give the signatures, but he said that if even one is against you and he is

powerful, this person will assemble a team and together they try to prevent the hiring. Further, he described that this was not only for personal reasons, but often jealousy, religious or ethnic dislikes. Influencing different positions can be so significant, and as a result, the processes can come to an almost standstill.

A decision to sign is made quickly when individuals with a higher social position have already signed the paper. If one refuses a signature it can show one's power, yet the risk is high that personal consequences follow. Documents can gain value, thus accumulating social capital in the form of signatures on the document. It also happens that individuals are eager to sign, especially if they are in a lower social position, as in that way they have the possibility to enhance their social position. If they have been asked to sign or approve something, they can return a request, and this means that their personal network has been extended.

Often it happens that individuals try to withdraw to sign. They would like to increase their dominance and power and refuse the signature. Some are just scared to sign because of the possible consequences. Consequences are often not immediate, rather they can threaten their position in the future. For example, once lecturers are hired, it is not easy to release them from their service. Signing documents such as the recruitment of lecturers can have long-lasting consequences. Maybe requirements have been manipulated, and so they are complicit in corruption, which might have no consequences now, but resurface later. In some cases, a refusal to sign has personal reasons, but sometimes also institutional dominance is exercised through the signature.

Another example is the acknowledgement of the master degree from Germany. After graduation from the TU Berlin, the lecturers wanted to legitimise the received degree, so that they are promoted to a higher academic position. The degree had to be presented at one of the departments in the MoHE. What should be rather a short procedure took months. Ministries and embassies demonstrated a power struggle about who can set the rules for the other. This struggle was not of personal intention, rather it was an institutional struggle. Sometimes because of such struggles, interactions lead to a deadlock, where one is waiting for another, or one is refusing because of another.



Figure 5-1: Master certificate from a lecturer

Resolving deadlock situations can delay processes for days, weeks or even years. It is not a rare phenomenon but rather a very common state. In this case, the Ministry of Foreign Affairs (MoFA) had to stamp and acknowledge the validity of the degree, which then should have been acknowledged by the MoHE. However, the MoHE required a stamp that the MoFA did not provide. The MoFA said that the Afghan Embassy in Germany has to revalidate the authenticity of this degree. The Afghan Embassy in Germany had stamped the certificates already, but the MoFA claimed the wrong person had signed it. Because the lecturers were already back in their country, they were asking me if I could take the papers back, let them re-stamp in Berlin and bring them back. The degree certificate has never been sent to Germany, because the Afghan Embassy in Germany already stamped and signed it and would most likely deny it, as it would mean the MoFA pointing out failures in the embassy. The whole process took around two months and several lecturers were running between the ministries almost daily. In the end, the degree had several stamps and signatures. Through constant persistence and the usage of relationships, the degrees have been finally accepted. The lecturers,

in this case, have worked together and have collected the degrees so that not everyone had to go through the same procedure. When finally accepted, they talked about how dreadful the processes are and how bad the degree looks. At the same time, they distance themselves from these old and bureaucratic practices.

The above describes the situation of the world of higher education and the politics within to reach an insight into where and how developments of computer science are embedded. As a non-established elite, the cohort of computer science lecturers has had to struggle. Within a system that is so dependent on personal and professional webs of relationships, struggles are dominantly about maintaining, consolidating and building relationships to reach a strong position within the system. The established elite naturally holds on to their possessed power and their position and status. Lenoir (1997:78) stresses that it is not rational to give up power, which makes the position and the action for a computer science lecturer difficult. Within social worlds or social fields, there are always struggles between dominant and dominated agents and this is also true for the establishment of computer science (Bourdieu and Wacquant, 1992). The above section aimed to draw a picture of the different worlds, while the next focuses more on the actors, the lecturers themselves and their social position and social role within this situation.

5.2 Ustad – Being a Lecturer

Being a lecturer in Afghanistan is something special. One is not only a lecturer within the university environment but also in a much larger sphere of action. Lecturers' roles extend far into public and even private life. The role carries responsibilities, not only professionally like educating students but also more generally as lecturers are considered as role models for a righteous life. At the same time, due to their function as role models, lecturers receive more opportunities and prospects to engage and shape public life.

The section begins with an exploration of the role of lecturers within Afghan society. The computer science lecturers have to negotiate their identity with this socio-cultural image of being a lecturer. In addition, they have to deal

with the different expectations of the international community, the MoHE and their universities or faculties. The lack of understanding of what computer scientists are and do requires constant reflection on the different interests and commitments in the different worlds and one's position. Reconciling the commitments and duties with the different actors, for example, between international and local actors, is a constant challenge. They need to conform to the societal role, as well as to fulfil the expectations of international actors. Additionally, the lecturers are trying to develop the discipline further. They seek to build a body of knowledge in computer science and claim authority over it. The processes show that the possession of computer science knowledge does not implicate authority over the domain, rather the necessity of political assertiveness.

5.2.1 The Role of Lecturers in Afghan Society

A lecturer in the higher education system is called *Ustad* (Dari: استاد). *Ustad* is a professor and the general term for a lecturer. There is a more detailed system for academic ranks (see 6.1.3.1), but in general one who teaches in a higher education institute like a university is called an *Ustad*. The use of titles is very common and shows the importance of local representation within the Afghan society. Titles carry a social function and describe a specific social position. In most social contexts, the title is carried around and will not be dropped. Lecturers call themselves by their title when they talk in the university environment, but often also when they are outside this environment, even if they are friends. In social events outside the academic environment, they maintain these formalities. This indicates that lecturers very seldom leave their role.

Being a lecturer contains responsibilities that are beyond mere teaching within a university. When asking lecturers about the reasons why they chose a career in academia, lecturers homogenously highlight their duty in the reconstruction process and their wish to contribute their knowledge back to the younger generation. There are, of course, individual motives, yet the wish to serve the country and contribute towards it predominates. One lecturer (Interview, 50) stated: 'For us Afghans, it is a holy job being a lecturer, because

you can pass your knowledge to others, teach others. It is a very good job in Afghanistan. You can earn respect'. This displays the importance of religion in Afghan society. During the fieldwork, I did not discuss religion with the lecturers in my interviews, conversations or even daily activities, as it is seen as a sensitive topic. While some lecturers say religion is a private matter, it does influence the way of life so that it becomes a public matter from my point of view; a public matter that has often been silenced. Islam as a state religion sets the framework for Afghan society. Islam is a way of living and is deeply ingrained in the daily lives of Afghans. This means the understanding of education and knowledge also stems from an Islamic understanding. This influences the understanding of the role of lecturers within the society which explains their answers and motivations.

Islam encourages acquiring knowledge. Education has an important role in providing children with knowledge and rules to participate in society. Further, Halstead (2004:526) stresses 'traditional Muslim education was not an activity separated from other aspects of society; it was rooted in the community it served, responding to its needs and aspirations and preserving its values and beliefs'. The answers of the lecturers reflect the importance of education for society. Statements like 'in this situation of my country, the big responsibility of our young generation is to solve the problems by higher education' (Interview 53) show that the lecturers feel responsible and believe that education can bring social change.

The emphasis being that education is serving the community and society they live in, the role of lecturers is not only limited to the university environment. An Islamic understanding sees the role of lecturers in a broader sphere. Halstead (2004:525) highlights that, due to this understanding, not only academic expertise is of importance, but also personal lives, beliefs, character and moral integrity are equally as important. Their sphere of action does not begin and stop when entering the university. Moreover, it is a life-long commitment. The private and professional sphere is merging, and the boundaries are very permeable. This is also visible among the lecturers. For example, there are many stories where lecturers tell that they have been asked for help or for favours which lie outside their duty as a computer science lecturer. Other lecturers, whose computer might

be broken or need any other technical assistance, approach the lecturer, sometimes even in the middle of the night.

Some of the lecturers come to my house at 10 or 11 pm. They say “my computer, my laptop, my flash drive, my CD is broken”. They have lots of problems to fix it. Do you know, they announce everywhere “I went to IC_3’s house to fix that small problem. But he couldn’t fix my problem. He doesn’t know anything.” I am trying to help them, I know these kind of things, but why are they saying this. They say that I do not know something, what I know.

(Informal Conversation, 3)

In their role as a lecturer, they are obliged to help. A refusal to help would show a bad character, egoism and unhelpfulness. Afraid of a bad reputation, in particular in a society that is based on a web of social relations, lecturers cannot refuse to offer help. At the same time, they are afraid that if they cannot solve the problem successfully, that their expertise will be threatened (see also 5.2.3). Alternatively, if successful, they report that they are constantly approached. Being a lecturer means to show a constant commitment to support and help others. It is a duty to share your skills and your knowledge and invest your personal time and efforts.

In return, the role of lecturers is highly respected within the society. Mogra (2010:317) points out through a reference within the Qur’an that ‘no other profession can compete in terms of virtue with the teaching profession’. In fact, within the society, people have deep respect for teachers or lecturers, as they are educating one's children and put their lives in the service of the country. This can help in any daily interaction; people change their behaviour if they know that one is a lecturer. This can be in a shop, at a police control or when running for official positions. As soon as they recognise that one is a lecturer, they show gratitude for one’s duty. Even as a foreigner, if people became aware that I was a lecturer, they offered me all their help. Being an *Ustad* opens many doors and made people more indulgent. It is known that lecturers’ salary is very low, that there is a heavy workload and huge responsibilities (Interview 30). Lecturers have studied and graduated with high marks to be able to be hired. It is perceived that, except for seeking knowledge and sharing it, there is no benefit for lecturers. Thus, seeking guidance, advice or inspiration from lecturers is encouraged (Mogra, 2010:320).

Because of the highly respected role, lecturers are often appointed to higher positions in the administration, and many of the lecturers chose their career because of this (Mogra, 2010:319; Informal Conversation, 61; see also 6.2.3) The lecturers envision themselves as future chancellors of universities, members of parliaments, ministers, advisors or even presidential candidates. This reminds us that the lecturers of today are the elite of tomorrow. Just recently, the new President of Afghanistan has been elected, a lecturer at a university, chancellor of a university, minister and now president. It is a realistic future for some of the lecturers, and they work towards it. So during their career as lecturers, it is not only important to reach academic excellence, but also to build strong relationships with other academics, intellectuals and political persons.

The elevated position of lecturers within society is very characteristic of Afghan society. However, this position also brings many norms of how to act within the higher education system. Lecturers' private and professional lives are under constant observation. Because few people can judge the professional expertise in their subjects, there is more emphasis on their personal lives, the character and behaviour of lecturers. Such judgements lean on an Islamic understanding of a good adult and being a righteous human being.

The role of lecturers in Afghanistan is much broader than in a Western context. Lecturers almost never leave their role in public or even in private situations. Such different understanding holds different challenges, in particular when introducing a new discipline such as computer science, as shown in the following section.

5.2.2 Being a Computer Science Lecturer

In the development of computer science, the computer science lecturers are one of the main actors in pushing the discipline forward. They are the main actors who are shaping computer science as a discipline within their universities, while at the same time they are forming their identity. The formation of computer science and the formation of their identity are in a continuous interplay. The following aims to locate the lecturers within the higher education system. While the section before described the lecturers' socio-cultural background that applies

to most lecturers within Afghanistan's higher education system, the next observes the particularity of the group of computer science lecturers. The focus is to show the challenges to finding a position in the higher education system by introducing the intersecting worlds through examples of their constant negotiations in their daily lives and routines.

Considering how the arena of computer science formed itself, one has to look back to 1995 when a computer science department was established at Kabul University.

In the year 1374 (1995), the computer science department has been established in collaboration with the science faculty at Kabul University. However, the situation after the establishment and the coming to power of the Taliban has changed our situation. We had difficulties to procure lecture materials such as books, software and hardware.

Despite all challenges we could compile teaching material for the first semester with the help of some Afghan friends in Pakistan. We began with two/three lecturers to teach and from semester to semester the material has been improved. A major challenge was the lack of PCs and PC laboratories. Afghans didn't know PCs and with the theoretical lectures, nobody believed us that this technology was real existing.

I can remember very well a story, where one of our lecturers was teaching about PCs in third semester within the department of Biology. Students told him that this could not be real, in the box, and meant was the PC, must be a ghost inside. But I already believed that also one day here in Afghanistan, people would know about this technology and will use it to their advantages. It would a matter of time until technology would be reached Afghanistan. The triumph of the computer cannot be stopped and the progresses in diverse areas of our live are very interlinked with this technology.

(Interview 1)

Despite the challenges such as the access to materials and resources, the lecturers' motivation and vision were important drivers in the development of computer science. While the education and higher education system has always relied on foreign support, the number of actors and the importance of computer science education changed during the years from 1995 until 2001.

In the post-2001 era, the arena of computer science in Afghanistan became more complex. In the sections before, several worlds and actors (see also 4.2 and

5.1) have been introduced, for example, international actors, the administration of the MoHE, governmental institutions, private universities or the private sector, who are all part in some ways of the developments of the discipline. Many of these worlds did not exist in the pre-2001 era. Moreover, only since 2005 when Herat University started the processes of giving computer science its own faculty separated from the science faculty as before, was it recognised as a discipline and gained attention within the world of the MoHE.

In recent years, computer science could position itself very well within the higher education system (see also 5.1). The discipline is well established in the West and especially the transformational character of ICTs and the research field of ICT4D has brought popularity to the discipline even in a development context (see also 2.2.3). However, the emphasis on ICTs and their application for developing countries diverted the focus from computer science as an academic discipline. Sutinen and Tedre (2010) reiterate that computer science is an integral part of making ICTs useful. Yet the focus of ICTs, which is pivotal in agendas of international actors and organisation, has also led to a marginalisation of scientific advances in the computer science discipline (Unwin, 2009:54).

In interviews, the computer science lecturers point out the problems in demarcating a domain of computer science. On the one hand, they have not yet established a body of knowledge of computer science themselves or have yet built an understanding what a computer scientist comprises in the Afghan context (see Chapter 6). However, the emphasis on ICTs in particular on the site of international actors and agendas also creates an environment where boundaries between information technology and computer science are blurry and not clear cut. For the lecturers, it is challenging to establish a discipline in an environment where only few people understand what computer science means in a Western context and what it could be in Afghanistan. Additionally, international efforts focus mostly on the establishment of IT infrastructure, on the diffusion of IT throughout society, on digitalisation of the administration or introduction of e-government, for example. Due to the lack of IT expertise, lecturers are asked to join and participate in IT projects. Thus, lecturers are perceived rather in their

role in the IT projects than in their capacity as lecturers. Often, these two different roles are equally understood.

Other lecturers or members of the MoHE experience a change of their working environment, that access to Internet is available, that they must use office packages or other software for their work organisation, and they link these experiences to the practices and tasks of the lecturers. That means that for outsiders the discipline is seen as just clicking around on computers (Informal Conversation 16; Interview 30; Interview, 48).

They think that there is Microsoft Word or Excel, but they do not know what computer science is. They can see that it is a new discipline, and there is money, but they do not know what gets established.

(Informal Conversation 16)

The existence of IT projects entails part-time jobs and additional income for lecturers working in these projects. This is in sharp contrast to the image of the lecturer occupation that is characterised by a selfless service to the country (5.2.1). This image of the selfless lecturer is in reality rarely found. The necessity to support the family and the uncertain situation makes it almost impossible to turn down the resources or benefits that international actors offer. Most lecturers across all disciplines seek further employment and additional income. However, for the computer science lecturers, it seems there are many opportunities created and they pursue them. Thus, other lecturers perceive that the computer science lecturers seek additional work and additional profit. This raises jealousy and envy among others and puts the lecturers in the middle of a conflict.

We are the generation with the laptops and the shoe polisher of foreigners that is how they see us.

(Informal Conversation 16)

The quotation shows the jealousy and disrespect of other lecturers, often from lecturers in other faculties or older lecturers. International actors seek to work with people who are motivated and knowledgeable in the area of IT and computer science in order to implement their IT projects. The glut of opportunities and attention to the new discipline with more or less young and inexperienced lecturers raises disconcertment. Computer science lecturers can

establish authority and respect through the attention and appreciation of international actors. At the same time, it makes the processes of how authority and respect are gained, which is usually based on age or working experience, seem secondary. This turns the hierarchical social order upside down. By working with international actors, the lecturers position themselves against the expected social norms. This is expressed in the quotation above.

In addition, it contains another observation. The metaphor of shoe polisher shows the compliancy and servility of the lecturers towards international actors. The world of international actors and agencies is already a world of struggles over dominance and resources. Such resources are not available without any disinterest. There is less cooperation, coordination and strategic planning among the different international actors. The establishment of IT-Centres is an example, which can illustrate the conflictive position in which some lecturers find themselves. Several donors invested in the setup of PC-Pools across universities. Two projects were and are quite conflictive in its implementation. There is the SILK-Afghanistan project funded through the NATO Science for Peace and Security Programme, which is the sole source of providing high-speed internet access through fibre-optic cable for governmental universities. Network Operations Centres (NOC) were established as the central point of network management, monitoring and control. At the same time, time the TU Berlin opened IT-Centres, which were supposed to be the central core of IT-expertise, providing network connectivity within the university, training members of the university as well as providing Internet working space. Both projects attempt to gain influence and shape IT policy based on their project strategies. Thereby, the SILK project is embedded into huge international projects with links to foreign networks and large amount of money. The TU Berlin project has been running continuously since 2002 and is more closely linked to local networks. The collaboration between the two projects is very limited, yet the responsibilities and envisioned tasks often overlap. While, the IT-Centres and the policies of TU Berlin were expecting that the NOC would be incorporated at the central IT-Centres, the NATO hired personnel, and provided training and strategic planning of network management separately. Conflicts arose, as both

projects offered job positions, salaries, and training abroad to ensure their influence on policies.

This has caused the lecturers to be positioned in the middle between these competing projects. In some universities, like Balkh, Nangahar, Qandahar, the same lecturer, because of a lack of IT experts was heading the IT-Centre and the NOC, which lead that the NOC had been integrated more seamlessly into the IT-Centre structure of the university. At the same time, the lecturer described that tasks and interactions had to be managed quite diplomatically to ensure the support of both. Within Herat and Kabul Universities, there was a larger pool of lecturers as well as of computer science graduates, so separate staff had been hired. In particular, at Kabul University, the NOC's servers are within the server room of the IT-Centre. Thus, the staff of NOC had to enter the rooms of the IT-Centre. Staff of the IT-Centre had switched to NOC, weighing the disadvantages and advantages of the two projects for themselves. As a result colleagues who had been on the same training and spent time together intensively, suddenly turned against each other. Best friends became enemies. In order to fulfil their responsibilities and meet expectations, they took over the alliances that had been pre-formed by international actors.

Lecturer: Before, we were friends, we didn't had any responsibilities. Everything was fine. But now as we have responsibilities we have to fulfil them. It is very difficult to keep friendship and work apart. Because, when I have the responsibility, like for example I am responsible for the IT-Centre, I can solve the problems for many people. I am more important, also often it means that you get more money. All this makes others jealous. They start working against you.

(Interview 42)

Whenever the Internet did not work in the offices, for example, the teams blamed one another. When trainings were offered, they tried to sabotage each other's trip. Sometimes, IT-Centre staff denied entry to the server room to the NOC staff, or introduced new policies that the server room could only be entered at specific times.

But whenever the foreign project partners are present, they show themselves as eager and helpful and collaborative. In return, project partners expect the

unreserved support of their projects. Continuous incentives are given to ensure support for the projects and that the interests of international partners are distributed and defended at all times. This means that lecturers are roped into interest struggles of international development. International actors can give symbolic power and hold economic capital but are politically less influential. Thus, lecturers speak in a friendly way to each other in front of their project partners, but as soon as they are among each other, they follow their own agendas and build local alliances which often contradict foreign alliances, because they are rather built on other dispositions such as ethnicity, religion, age, gender or family. Within the mixture of these diverse relationships and memberships in different worlds, it is still difficult to determine when lecturers decide to rely on which relations and, most of all, when the interaction that takes place is genuine and honest; it is difficult to detect who are friends and who are enemies. Conflicts stay in the local worlds, and are not often revealed to international partners to ensure support of them.

The lecturers try to gain a strong position with foreign actors, but at the same time try to gain a strong position within the local higher education system. With the focus on strengthening their own position, Monsutti (2013) indicates that one strategy within Afghan society is the diversification of relationships in order to cover a larger terrain, thus extending the influence arena. This means that the relationships are extended in different areas that are influential, such as ethnic, regional, political and kinship as well as professional. This can be observed among the lecturers. They seek relationships among the international actors as well as the political elite, with members of ministries or political parties, they draw back on kinship and family relationships, but they also form groups based on their ethnic background.

The strength of relationships is based on the frequency and length of interaction. It can be observed that over time relationships have manifested, and specific relationships are more dominant than others. Among the computer science lecturers, it is visible that some relationships are stronger than others, and some relationships are more dominant temporarily. The group of computer

science lecturers are not homogenous and it has clustered into several smaller groups over the last years.

Predominately, lecturers are grouped based on their universities; the spatial distances hinder frequent interaction. In the capital Kabul there is a diversity of Afghans living, working or studying. In the provinces, there is less diversity. At Kabul, students or lecturers are from throughout the country, in the provinces they are from the surrounding provinces and districts. Nevertheless, lecturers from Kabul studied in Kabul. Kabul University has hired all of their lecturers from their own faculty. Even the older generation studied at the Kabul University. The computer science faculty at the Kabul Polytechnic is predominantly comprised of lecturers from Kabul University, but also from their own faculty since they have the first graduated class. Similarly, in the computer science department at the Kabul Education University, the current lecturers were students at Kabul University.

At Herat University, the diversity of the student body is limited to the students from the surrounding provinces and Herat City. Among the student body, provincial students expressed their disadvantage and pointed out that because the lecturers are Heratian, they try to show their superiority by letting them fail. The lecturers at Herat University are from the city itself, or they have family roots in the city. Some of the lecturers went to school in Iran, but returned for their studies to Herat, as Iran did not allow Afghan refugees to study at the universities. All, except one lecturer have studied at Herat University, thus they know each other since their studies.

In the provinces, the recruitment of lecturers has been difficult. The low salary already is an obstacle for provincial candidates, as they do not command a network and support system within the city. Thus, most of the time, graduates from the city applying to the universities, which makes it difficult for recently established faculties to find graduates, as they often have to wait until their first class is graduates. At Balkh University, positions were announced for a long time, until lecturers applied. The faculty could recruit some lecturers from their first graduated class, but also several lecturers who studied at Kabul University. Their families are from Northern Afghanistan, and they returned to their province after

their studies. The competition for lecturer positions in Kabul is quite strong, but also living costs in the capital are severely higher than in Mazar-e-Sharif for example. At the faculty in Nangahar, the lecturers graduated from Kabul as well as from Pakistani universities, mostly Peshawar which is very close to Jalalabad. In the newly established faculty in Qandahar, lecturers have studied at Herat, Nangahar or Kabul University. Their families are from Qandahar and only for their studies they went to the nearest universities. Similarly in Khost, where the lecturers mostly did their studies in Nangahar or Pakistan.

There is not much exchange and mixture between universities. Most lecturer have not even seen another computer science faculty, except where they have studied and where they teach. However, the lecturers all know each other. Their meeting point is Kabul, and other provincial universities are unknown to them. Even the MoHE visits their provincial institutions rarely. One lecturer in Khost, reported, that because of the insecure and unsafe way to Khost, the priority is on other faculties, which are more easily accessible.

Me: What are your biggest challenges in the computer science faculty?

Lecturer 1: Our problem are lecturers. Actually, we can't find lecturers to apply for our *tashkil* positions.

Me: We have a similar problem in Balkh. We can't find people who want or can apply for Mazar.

Lecturer 1: The problem is that people from Khost do not want to go to Mazar for example or people from Mazar do not want to come to Khost. Also, there is a big market for computer science and telecommunication companies want to hire graduates and provide jobs. Second, I think, if you want to become a lecturer you have to wait for one year and then you get only 4000 Afghanis. This is small money.

Lecturer 2: Hiring people as lecturer is not a problem, but problem is their level of education. We hire a graduate of computer science as lecturer, but he doesn't know about computer science, because the level of programming or networking for example is not very high yet. We need master scholarships for our province. There should be a quota for provinces. The MoHE helps Herat, Balkh or Nangahar, but if it comes to Khost, they forget. They are looking for easy places, where you can go easily.

(Interview 30)

The affiliation with their university is often expressed in interviews by pointing out how great one's own university is and that the situation is different than at other computer science faculties. Within the faculties, lecturers are further grouped based on their educational background, for example. As one lecturer already stated earlier, shared experiences such as studying together encourages friendships and unites them in their own created world. Studying for a master degree for two or more years, these shared memories of experiencing a new culture and a new education system are formative. When returning to Afghanistan, these relationships are kept alive in the form of regular meetings, conferences, further trips. If not, these groupings become secondary. However, when lecturers meet again at a conference, for example, after a long period, these relationships are often reactivated; previously established trust is not really altered.

Further, lecturers also group themselves based on their knowledge and expertise. Here, the level of scientific competence and expertise is influential. Lecturers with a lower level of scientific competence pair up with lecturers with similar low competence, likewise ones with stronger scientific competence pair up with lecturers who also have stronger competence. While the groupings are formed based on levels of scientific competence, the influence on the situation is often detached from the scientific competence possessed. Again, struggles are transferred to political arenas. The lecturers with low scientific competence try to rely on the social competence and social capital that they might receive from international project partners. Different relationships are used to curtail the growth of scientific authority. Some of the lecturers with stronger computer science competence complain that their expertise is not recognised, as seen in the next section. In the end, the goal is to strengthen one's individual position by maintaining and building relationships and alliances.

In general, it is noticeable that the formation of the interaction is complex and constantly changing. The next chapter investigates further on how this interaction is taking place.

5.2.3 Claiming Authority of Computer Science Knowledge

The social world and the social competence of the lecturers are central to the understanding of the arena of computer science. The position of computer science lecturers depends on several factors. Previously, the importance of the diverse worlds and relationships and their utilisation was highlighted. The politics of the higher education world strongly defines the social field. Less emphasis on the scientific field stems from a low prioritisation of the scientific field, in general. Moreover, in order to maintain the structure and hierarchies, in general, any scientific authority is questioned and attacked so that its influence is marginalised. However, due to attacks on scientific competence and the emphasis on social competence, lecturers get roped into political struggles and often neglect scientific improvement (Informal Conversation 65). Attention is shifted away from scientific debates and always pushed back to political and social struggles where hierarchies and structures are in favour with an already established elite. Computer science lecturers are disadvantaged in this regard, as mentioned earlier (see also 5.13).

The following explicates how scientific authority of computer science lecturers is questioned and under attack in different spaces. Reaching scientific authority in Bourdieu's (1975:19) definition is 'the monopoly of *scientific competence*, in the sense of a particular agent's socially recognised capacity to speak and act legitimately (i.e. in an authorised and authoritative way) in scientific matters'. In order to reach such competence, Wenger (1998) stresses the participation in scientific communities and communities of practice. Further, highlighting that mediators and role models help in the participation process, it has been pointed out previously that such supporters and role models are missing in the arena of computer science developments in Afghanistan (see 5.1.3). The lecturers have gained scientific authority in the sense that computer science is a recognised discipline and that lecturers are legitimised to speak about issues around computers. However, in order to prevent the lecturers from using their gained scientific competence, the scientific competence is questioned on different levels to impede a general strengthening of it.

Lecturers report that their authority is questioned and they have to justify their expertise on all levels. It starts in the classroom, where students question their knowledge and expertise. It happens in the faculties and universities where lecturers among themselves compete against each other and it also happens on the ministry level, where with administrative obstacles, scientific competence is contested or disputed.

The students as an actor group do not have much influence on decision-making processes, in general. The students' priority is to ensure that structures remain in place, as any changes will endanger a straightforward course of the degree. The rise of quality within the higher education system and the changing teaching methods which computer science lecturers try to introduce (see also 6.1 and 6.2), bring disruption and concerns to students. Thus, the students' first approach is to attack the sovereignty of lecturers in the classroom, by questioning their knowledge and expertise. Some of the lecturers report that students were complaining about the knowledge and expertise of the lecturers. Students base their complaints on narratives and construct for themselves what *good* teaching, a *good* degree and a *good* teacher means (see also 6.2). At first sight, such construction seems arbitrary and shows a lack of awareness by students. For example, one lecturer described:

Lecturer: The first time I went to the class, second class of mathematics department, they asked me, "Are you bachelor or master you came here to teach us?" They wanted to have a computer science lecturers for Word and then they demand a master one. It was really shocking.

Me: How did you react to this?

Lecturer: I didn't said anything. I can only lose in this. If I tell them not to do this, they talk behind my back and problems get more – ignoring is the best. You know, students, some closedminded ones, think that Word, Excel programs are computer science. This is a main point that really discourages me.

(Interview 61)

In this example, IT skills and computer science knowledge has been mixed up again. Additionally, students misjudge what expertise is needed to conduct such a course. The consequence is that most lecturers describe themselves as demotivated because their knowledge and expertise is ignored. Even further,

they are judged by students who cannot even comprehend their knowledge and expertise and cannot determine what is required. 'We cannot utilise the knowledge we learned in our master degrees, it would be too much for the students, but the students think we do not know' (Informal Conversation 64). 'Students think they know everything better, that they should be asked for their opinion, that their feedback must be important to us because the university is there for students. But they also have to trust' (Informal Conversation 63). This is in sharp contrast with the respect students should have towards their lecturers. Yet, students can attack lecturer's authority and reputation and use this to ensure, that lecturers do not fail students and do not make problems for them (see further explanation in 6.2.2). All this accumulates to demotivate the lecturers, especially the younger ones who recently gained their master degree from foreign countries and tried to utilise their knowledge and bring changes. Their knowledge, as well as efforts, are not acknowledged. Additionally, they have to justify constantly their knowledge and expertise to maintain the *status quo*.

It is not only students who attack the lecturers to maintain and secure the existing structures. Even within their faculties and universities, scientific authority is in question. Lecturers meet mostly in official board meetings or councils, faculty meetings or conferences and when they meet, struggles and fights arise.

At one of the conferences, lecturers discussed the implementation of the Higher Education Management Information System (HEMIS). One of the lecturers complained that the expertise of the university in particular the computer science lecturers, had not been asked. The system is unsatisfactory, he claimed. Another lecturer, who supported the HEMIS project and worked also at the MoHE answered, that all complains were raised only after processes were almost completed. He answered that the lecturer should not complain, as he works outwards and earns lots of money. Going once a week to his university to give a lecture and otherwise goes after his own benefits is very bad, he said. Being sent to a Master program, first priority should be working for his faculty, instead the lecturer who complained is only travelling and goes after private work. He,

himself came back after his studies and works for less money at the MoHE and towards the HEMIS. Everyone is defending one's own interests, which is not unusual. Lecturers state this to show dominance, yet if you want to restrain someone, then one must rely on having more political influence and power through one's network. It is important to show dominance in the situation but also to disseminate it into their faculties. In a society where reputation and networks are decisive in establishing a strong social position, it is inevitable that the reputation is open to attack and thus vulnerable.

When lecturers convene in official meetings, one can see the fight for dominance. On the one hand, dominance is shown by the frequency and length one speaks, but because the time allotted for speaking is correlated to authority perceived, everyone tries to speak, and issues move in a circle and are discussed to death. The emphasis is not on knowledge gain, rather on presenting one's knowledge. In discussions and meetings in a variety of faculties and disciplines, scientific authority is demonstrated not through computer science knowledge but through a discussion about general definitions. For example, I was at a meeting of the research council. Instead of collaboratively discussing how to receive funding and learning how to write a research proposal, the discussion for 45 minutes evolved around the definition of what a proposal outline is and should contain, or what a research objective is. Further, the belief exists that there is an absolute definition available. Thus, participants argued over what a proposal is and how it should be structured rather than discussing its content. One participant would argue about the objective of proposals with the belief that she or he knows *the* correct way. Another participant would contradict that and would explain her/his understanding as the correct answer. Thus, discussions turn in circles and lecturers often state that it is most important to say something. Participating in the discussion is the key concern.

Focusing on definitions and, deflecting from issues disregards the lecturers' ambition as academics. Lecturers, in particular the ones who have been abroad, state that they also want to do research and stress that their job description even requires them to do so (see also 6.1.3.1). But because of the heavy work load, the priority to earn money at another part-time job, the political

struggles, or the demotivating and unappreciative environment, most of the lecturers forget their ambitions to do research and focus only on teaching.

When the computer science lecturers meet each other as part of conferences or similar, rather than benefitting from each other, learning from each other, or discussing constructively about their ambitions as a scientist, they fall into a pattern of exposing each other's knowledge gap. Here, the quality of the questions is secondary; primary is the dominance in speaking time as well as the fact that one participates in the discussion. In particular when people outside someone's subject area participates, this behaviour is dominant. In conferences, questions do not targeting the key point of a talk; they rather focus on further topics. It is often to demonstrate one's own knowledge in the question and to find a lack of knowledge in the presenter. This is often backed up with random statistics, key words or buzzwords to intimidate. 'Everybody wants to kick the other persons down. There is no helping each other. (...) Everyone works political. All want to be political, but nobody wants to work scientifically' (Informal Conversation 37).

By 'everyone', it is not only colleagues and other academic staff who are involved in such processes but even administrative staff within the MoHE demonstrate how the scientific authority of newly qualified computer science lecturers is not appreciated and put into question.

The constant attacks on the scientific competence of the lecturers leads to their demotivation and demoralisation. They themselves turn towards the strengthening of political and social positions and neglect scientific development. A vicious cycle starts as, for a further scientific career, they need to enhance their scientific competences. Many of the lecturers would like to continue with a Ph.D. because it would ensure a career in academia or other areas. Many have not been working scientifically for years. The virtual standstill of personal scientific development is further discussed in 6.2.4.

5.3 Summary

This chapter has introduced the arena of computer science and provides an overview of the situation in which computer science development takes place.

The discipline gained a strong position within the higher education system but also within society. Several worlds are supporting the development of computer science within the higher education system. The influence of international development and the importance of the politics within the MoHE are crucial in understanding computer science developments. The group of lecturers is often positioned in the middle of these worlds, and negotiates and communicates in order to work towards their vision of computer science. The partnerships with international actors are highly favoured, but the internal politics of the MoHE are still decisive, thus requiring coordination and negotiation. It has been highlighted that the social order is marginalising scientific competence. Struggles are mostly shifted into worlds where social competence is in favour with already established elites.

This chapter also illustrates the role of the lecturers within the arena more concretely. The role of lecturers has a larger sphere than just the world of higher education. The social norms and values that are attached extend even into their private lives. This indicates that the boundaries between social and scientific matters are permeable. The responsibilities of computer science lecturers are ambiguous due to the variety of IT projects and the unclear understanding of computer science. Consequently, the expectations from the MoHE, the international actors, the university, the colleagues and the students are diverse and difficult to satisfy. Because of the lack of importance of scientific competence, social competences such as diplomatic and political skills are necessary. Lecturers decide continuously which relationships are important, which relationships need to be built, maintained and consolidated in order to strengthen their social position within the higher education system. Because the discipline is newly developing, the lecturers have no role models or strong supporters within the local world, thus spurious action is inevitable. Further, to maintain already existing structures and power dynamics, lecturers' authority of computer science knowledge is under attack. The difficulties and the fragile situation for the computer science lecturers indicate their difficult position in the establishment.

This chapter introduced the broader arena in order to focus in the next chapter on the lecturers and how they are transferring their vision of computer science into the classrooms.

6 The Role of Lecturers in the Construction of Computer Science

This chapter focuses on the role of lecturers in the construction of the discipline. In contrast to the previous chapter, which introduced, *where computer science developments happen* by focusing on the arena, this chapter engages with the sub-question, *how do computer science lecturers in Afghanistan construct/understand their discipline?* Understanding how the lecturers construct computer science involves untangling the complexities of the processes and practices in the establishment of computer science. Attention is given to the different actors and worlds with which the lecturers interact. The insight into processes of how lecturers build an understanding about computer science (see 6.1), is useful to support lecturers in the transfer of computer science into the class rooms and in establishing a strong discipline (see 6.2).

Reviewing the construction processes in the US, UK or other pioneer countries, the question in the discipline formation process revolved around the question of what computer science is (see 2.1.2). It was a problem about the demarcation of science. Nobody asks the question in Afghanistan. As previously established, computer science in Afghanistan does not exist in a vacuum; moreover, it is an internationally recognised discipline.

So what comprises the construction of computer science? Through the discussions with lecturers, international organisations and our project team at the TU Berlin, it became clear that the question is not, 'What is computer science?'; rather, a different question needed to be asked: 'What is a computer scientist in Afghanistan?' The complexities and dependencies in the establishment of understanding what a computer scientist does and knows, or needs to do and needs to know in Afghanistan is the first discussion, which follows in this chapter (see 6.1). It is an example of how 'various issues are debated, negotiated, fought out, forced and manipulated by representatives' (Strauss, 1978:124). All actors want or have to contribute to the establishment of computer science in the higher education system; the collective action and its

origins, impacts and consequences are illuminated here. Becher (1989:1) emphasises that disciplines are constituted through the 'relationship of people and ideas'. The lecturers' perspectives on *what is a computer scientist?* are in the centre, but the other worlds are illuminated as well to see the interdependence and interactions among them. Lecturers' perspectives are influenced by and influence the worlds around them. Students, colleagues, IT companies, international development projects and ministry activities all shape pre-existing visions, ideas and orientation of the lecturers. Lecturers discuss and negotiate how they want computer science to be, which is directly related to how they want to be themselves. The next section utilises the curriculum as a boundary object and shows how the other worlds are active in the construction of a curriculum. The construction of a curriculum, either for their faculties or in order to standardise computer science education nationwide, allows an insight into the processes of how computer science comes to be.

Subsequent to the discussion on how the lecturers constituted computer science education, the next section (see 6.2) follows up the question of how to implement computer science education in the higher education system and how to transfer it to the classrooms. The answer of most lecturers would probably conform with this: 'first, we need *good* degrees to gain *good* knowledge, then we can provide *good* teaching which then leads to *good* quality education' (my own summary). This very linear approach to reach a sustainable and strong computer science degree is a common view among the lecturers. How lecturers establish what a *good* degree is, how they get *good* knowledge and what *good* knowledge means to them are questions that are addressed in the following pages⁷. They discuss and negotiate what computer science education should be. Meanwhile, they implement their vision and ideas in the classrooms. The struggles that arise during the discussions, negotiations and interactions with all involved actors leads back to questions about identity construction of the discipline.

⁷ The adjective *good* has been used by the lecturer, thus throughout the chapter I refer to *good* degrees, *good* teaching and *good* knowledge. The aim is to unpack what meaning they attach to the terms in 6.2.

Both sections aim to combine already introduced issues and topics on specific examples to highlight the complexities of the broader situation in the construction of computer science education.

6.1 What is a Computer Scientist in Afghanistan?

The focus of this research lies on the lecturers as a group, as they are the ones who are teaching the degree programmes of computer science in Afghanistan. This group is still small, but as described earlier, they are not a homogenous group (see 5.2). Their perspectives of what computer science is and how computer science should be taught are very diverse. In the end, they are together constructing the image of a computer scientist in Afghanistan. This image is formed based on their experiences, expertise, their expectations and vision. It includes priorities and compromises which are reflected in an organised body of knowledge and its formalisation – the curriculum. Already in the construction of a body of knowledge, it becomes apparent that the perspectives of lecturers are accumulations of their educational background, their workplace, their political orientation, their personal and scientific ambition. Within the administrative structures of their faculties, universities and the ministry, these views are adapted to global agendas and/or local politics. The outcome is a curriculum that presents the perspective of how the discipline is seen (see also 2.1.3.2).

The curriculum describes and represents the scientific world of computer science; it defines the knowledge needed to be a computer scientist. The creation of a curriculum follows many discussions about theory and practice, and constant discussions about the content (see also 6.2.). Most importantly, it sets priorities for what role computer science will play in Afghan's national science system. Is computer science serving the private sector, aiming to strengthen solely the economic demands, or is it serving the higher education system by strengthening computer science education within the universities or is it serving to foster more research?

These questions are being discussed right now by the lecturers and the challenges in the establishment of computer science become apparent when tracing how this international discipline is becoming established in Afghanistan.

The professionalisation of the private sector and the market demands are not comparable with developed countries. Thus, the knowledge and skill sets in demand are not equivalent to those of a computer scientist who graduated in a developed country. At the same time, the professionalisation of computer science as an academic discipline, which is mostly influenced by foreign countries, indirectly or directly aims to orient itself to the international curricula. International academic exchange is sought and requires lecturers to conform to international standards. Thus, lecturers have to negotiate the knowledge and skill set for a computer scientist in Afghanistan, thus constructing the picture of local computer science, while simultaneously seeking credibility within the global disciplinary community.

6.1.1 Establishing an Organised Body of Knowledge

The literature review (2.1.3.2) points out that in order to professionalise as well as to give value to the academic discipline, an organised body of knowledge is needed (Ensmenger, 2010; Gotterer, 1971; Abbot, 1988). Similarly, students, graduates and academic staff in Afghanistan aim to obtain such a body of knowledge. They intend to strengthen their position within the higher education system, the labour market and broader society and to gain accredited scientific authority and competence. Abbott (1988:54) emphasises that '[a]cademic knowledge legitimizes professional work by clarifying its foundations and tracing them to major cultural values'. Thus, if the computer scientist lecturers specify their body of knowledge, they will be able to establish a skill set for the labour market that gives them further power and control over their knowledge base. In contrast to the Afghan lecturers, the computer specialists in the 1950s and 1960s defined and demarcated a new discipline, distinguishing themselves from disciplines like electrical engineering, mathematics or other related subjects. A definition of the discipline in the context of Afghanistan is based on existing international models of computer science. Nevertheless, copying or transferring an existing model of computer science is not possible and an adaptation or localisation to an Afghan understanding is inevitable.

Due to the novelty of technology as well as the discipline, a scientific community in computer science did not exist in 2005. Foreign lecturers like me have taught computer science at Afghan universities, they have set the agenda and the curriculum, decided what computer science should look like. Most of the lecturers were at that time students; they experienced different perspectives of computer science and various curricula, often in a rather unstructured way⁸.

Within our project, the long term objective is support in the establishment of academic structures in computer science. In 2005, we were a team of several German lecturers teaching at Herat University towards the bachelor degree of computer science. Starting in 2008, we trained 25 local graduates and prospective lecturers from six universities through a master's programme at the TU Berlin. Herat University was a pilot project and a model for computer science education and the graduates of the master programme at the TU Berlin adopted/took the approaches and concepts and transferred them to their faculties. The programme was financed by the SHEP Programme of the World Bank, who prioritised Kabul University, Kabul Polytechnic, Herat, Balkh, Nangahar and Qandahar universities. Within our project emphasis was given to Herat due to the existing partnership as well as to Balkh University. Two lecturers from Balkh who graduated the master programme returned to set up a computer science faculty according to the model of Herat. The TU Berlin supported this, also because it fitted well into Germany's commitment in the Northern Provinces. Within this framework, I supported the computer science faculty as a lecturer during my fieldwork. Now, the local lecturers have taken on responsibility to construct with their expertise a common understanding of what computer science is for the future generation of computer scientists. They are the active implementers and instructors of their subjects and courses and the computer science degree in general. Within their faculties and departments, they came to

⁸ At Herat University, students had no regular semester terms. Through different projects, different lecturer teams have been taught at the computer science department/faculty there from 2005 to 2008 (see also Peroz and Mahr (2006)).

an agreement about what should be taught in the classes⁹. Yet the degree of participation in the design of the course subjects or the degree programmes varies from faculty to faculty. The degree of participation depends on the composition of lecturers within the faculty.

In Kabul, one lecturer said, 'I hope I can join [the committee for curriculum development], but most our elder lecturers will be'. By mentioning that these circumstances might be particular to his university, the lecturer added 'yes, when I hear what lecturers from Herat say about their university and I compare my university, then it is very different. In here, the elders are boss and we are employees, but in Herat University, everyone is boss. That's why they are encouraged and they work hard. But when we say something, they listen; for example, our dean, he listens, but he says you don't have experience and skills, we will do as we know' (Interview 61).

In Herat, where only newly qualified lecturers teach, the atmosphere is more participatory than in Kabul, for example, where computer science has been established for longer and hierarchical structures are entrenched. The lecturers in faculties with only newly qualified lecturers experience more freedom in teaching and creating their faculties, but they had to take immense responsibilities from the beginning. In Herat, the lecturers talk about the pressure and expectations, lecturers in Balkh mention the missing experience to deal with the situation. 'Nobody teaches you how to do it. Here you go from student to professor. I would like to have a position as an assistant professor, instead of doing everything by myself. During my studies in Berlin, I saw how the professors [in Germany] gave their lectures and the assistants were doing all the rest, taking parts of the teaching, listening and holding office hours' (Informal

⁹ Herat University requested a curriculum from TU Berlin, which has been distributed to Balkh and Qandahar Universities. At Kabul University, Kabul Polytechnic, Kabul Education and Nangarhar, the curriculum has been developed by the faculty itself in line with the ACM/IEEE curriculum. Khost and Konar developed the curriculum themselves, but had the Kabul University model as a foundation.

Conversation 13)¹⁰. But when observing the situation in Balkh, who could have given such possibilities to the lecturers? The two graduates from the TU Berlin programme, had been sent back to Balkh with the mandate to open the faculty. There were no role models, or any local professional support. They had to manage all task by themselves.

Their experiences during their studies in Afghanistan as well as in foreign countries shape their ideas of how computer science education should be, but most have studied their undergraduate degree in Afghanistan and only done their postgraduate degree in foreign countries. The quality of the undergraduate degree is still weak and most lecturers studied in an education system which is based on fact accumulation and reproduction of knowledge, where their lecturer reads from a script and the students repeat it verbatim. The content, which they are teaching now, has often never been studied in detail by themselves. One lecturer describes his challenges: 'My first year teaching was difficult because I was not properly prepared. (...) I am normally using books, besides that I use the Internet to prepare. I am teaching fundamentals of information systems. I teach them about installation and also HTML and CSS' (Interview 50). He studied Java as a programming language at university but he did not use it practically, which meant mostly that they just wrote their code on paper, and never produced code that is able to be compiled. Most lecturers state that teaching has been challenging as the learned knowledge has never been used practically (Informal Conversation 19; Interview 30; Interview 50).

Most of the time, a curriculum is given to the lecturers that, as mentioned before, some have contributed while to others it has been given, either by more experienced lecturers or by foreign universities (see details also 6.1.4). These given curricula are often vague, too ambitious to implement in terms of the content and often ignored. The quotes above, the reports of other lecturers and my experience as a lecturer confirm that direct and immediate implementation

¹⁰ The Afghan higher education system has an academic position of assistant professor included, but in some universities, the duties of lecturers are the same as for a full professor. They have to teach, set exams, supervise and do research.

of these international curricula is impossible at the moment. There are four reasons for this. First, lecturers rarely have the expertise to implement the lectures in a satisfactory and confident manner. Second, students would not be able to follow the high-standard content that these curricula require. Third, lecturers and students do not see the applicability and the demand within their environment and switch to other content. Fourth, access to material and laboratories is not available in all faculties.

The missing experience and familiarity and the way this knowledge has been gained impedes a complete understanding of the content and thus the transfer of that knowledge to the students. Preparation via the Internet and the copying of other universities' material can guarantee the reproduction of the information but it cannot ensure its understanding.

In selection interviews for master scholarships for the TU Berlin, it was one of the main aims to test whether or not the lecturers were able to transfer their computer science knowledge to different scenarios. This also was intended to test if they were able to go beyond the reproduction of knowledge and understand where and how their knowledge could be applied.

Sorting algorithms are a fundamental part of computer science education and can be found in any international curricula. In Afghanistan, sorting algorithms are also taught. During the selection interviews, questions about sorting were asked. Most lecturers could name the standard sorting algorithms. They were able to explain elementary sorting algorithms such as bubble sort, quick sort and merge sort but most had difficulties in explaining the use and the application of sorting algorithms in general. The selection committee asked particular questions about the bubble sort, because everybody could name it. The bubble sort is a simple sorting algorithm. Knuth (1997) analysed the algorithm in the 'Art of Computer Programming' and concluded '[i]n short, the bubble sort seems to have nothing to recommend it, except a catchy name and the fact that it leads to some interesting theoretical problems'. Nevertheless, bubble sort is what every student gets taught in their computer science education.

Lecturers were usually able to name the advantages and disadvantages, and established that the bubble sort is simple and inefficient. When asked why

bubble sort is taught at universities, all hesitated. Only one lecturer said that he teaches bubble sort because it is the easiest algorithm to explain to students to address the concept of sorting. It was an examination situation where the lecturers had to answer under stress, yet it presents a quite accurate picture. Lecturers often do not question or critically reflect on the knowledge they impart. In extreme cases, this meant that even false information was given to the students. Lecturers provided scripts with errors and taught and gave examinations based on them. Mathematics scripts which relied on incorrect Boolean truth tables were examples, where it becomes obvious, how low the quality of lecturers and their knowledge could be. In this case, the lecturer could not even verify the correctness, and even in examples on the whiteboard, he conducted wrong examples.

For students, it is difficult to understand abstract knowledge, when they do not see where and how to apply that knowledge. Yet lecturers should be able to understand it, so that they can transfer their knowledge to the students. While the school system improves and students satisfy better preliminary requirements, they still would not be able to grasp a standard computer science curriculum in depth. In 2005, I had students in a class who had real difficulty applying basic arithmetic operations such as multiplication and division. At that time, I explained the conversion of numbers from the decimal to the binary system. I noticed a student that did not understand the concept of a remainder when converting numbers. After explaining and questioning her further, I realised that she did not know how to multiply and divide numbers. This would be an exception nowadays, but schooling is still rote-learning and teacher-oriented. Students struggle because their studies now incorporate and require practical exercises in which they have to solve problems to gain an understanding of the topic.

In daily life, lecturers deal with students of immense differences in knowledge levels and diverse levels of dedication towards their studies. Additionally, they experience the pressure of students who want to pass their studies successfully. The situation varies between all classrooms and faculties, but often a mixture of the above descriptions can be experienced. This makes it

difficult to establish an organised body of knowledge and even more challenging to transfer it. Lecturers have difficulties in the transfer because they do not possess the capabilities, they lack teaching experience or are too ambitious about what can be taught. Similarly, the level of students varies and sometimes students do not have the prerequisites and cannot grasp the meaning of the lecture. Thus, lecturers and students have to adapt to what content gets taught. In some cases, these adaptations are smaller and in other cases they are larger. In some cases, lecturers react to students, sometimes students force lecturers to adapt. These challenges stem from the different conceptions of students and lecturers of what a computer scientist should know or do, but also what a university degree in computer science should deliver. This is further expanded in 6.2.2 and 6.2.3 where the discussion examines the actual implementation towards a strong computer science discipline and what students and lecturers understand under *good* knowledge which they want to gain and *good* teaching that they want to conduct or want to receive.

6.1.2 Professionalisation of Computer Scientists

The complexities and dependencies in the establishment of what a computer scientist does and knows become apparent when stepping outside the classrooms and the university environment in general. The image of a computer scientist is not only created by the lecturers and their experiences in their studies. Lecturers and students also observe what job opportunities exist for graduates and what knowledge they require. Ensmenger (2010) emphasised with regard to developments in the 1950s and 1960s that '[t]he emergence of computer science as an academic discipline can only be understood in terms of the larger pursuit of professional status'. As seen before (see 5.1.1), the computer science discipline in Afghanistan could gain a high social position because of an increase in technology, the emphasis on the knowledge economy and the job opportunities created. Thus, the image of a computer scientist that lecturers have in mind is not only created by scientific and academic experiences, it is complemented by the picture of what skills and knowledge one would need to be successful on the job market. This leads to questions of how the body of knowledge that is taught in

the classroom is influenced by knowledge and skills required by the job market as well as *vice versa*, how the knowledge and skills that students learn influence the job market.

As mentioned before (see 5.2.2.), being a lecturer means to serve the country and educate the new generation of Afghans, in particular with the motive of rebuilding society (5.2.1). Thus, establishing a strong discipline that can contribute to the reconstruction process by producing skilled graduates is a strong motive of the lecturers. They all believe that information technology can bring social change within the country. At the same time they are very aware of the economic situation in their region which will be further introduced in 6.1.2.1. Being a computer scientist can ensure economic income for the family which is one reason why many students pursue such studies, but the body of knowledge taught in the classroom and the one needed in the job market are not compatible. While the computer science knowledge in the faculties is more or less prescribed by the curricula in place, which are mostly a copy of international curricula, computer science knowledge in the job market is difficult to classify or categorise. Nevertheless, there is an interplay of both and, furthermore, the technology in place and the skills and knowledge taught shape each other. The influence of the private sector is described by focusing on Herat University as well as Kabul. In the case of Herat, the establishment of an IT-incubator has shaped computer science education (see 6.1.2.2). In the case of Kabul, companies such as CISCO provided material which have been incorporated in the curriculum and have influenced computer science developments (see 6.1.2.3).

6.1.2.1 Economic Situation, Employability and Job Opportunities throughout the Country

The topic of employability and job opportunities is pervasive in the general discourse of lecturers and students. In 6.1.2.2 and 6.1.2.3, it is highlighted how the private sector affects lecturers' positions and how this in turn affects computer science education.

There are contradictory observations about the *real* situation of job opportunities for computer science graduates. Section 4.3 described the position

of lecturers in explaining employability, and the demand for computer scientists differs immensely (see also Figure 4-8). All lecturers agree that computer science graduates do not remain jobless. Yet, there are no studies that survey the situation and give feedback on how many people graduated, where they work, how many companies there are, who is offering jobs, and the extent of the demand for IT professionals.

Within Kabul, but also in the provinces, graduates find employment but in further discussions, it becomes clear that most work in jobs where they do not apply the learned skills.

There are significant regional differences throughout the major regions where the computer science faculties are located. In particular the political and security situation has an influence on the economic situation and the job opportunities that are created. During my fieldwork (2012 – 2013), many of the lecturers pointed to the insecure situation. The withdrawal of the troops in 2014 caused unease for many. Many anticipated a collapse of the job market, as much of it relies on foreign aid and foreign investment.

Armstrong and Rubin (2003) pointed out that despite the affirmation of U.S. officials, few people within the country believe that the commitment for the reconstruction of the country as well as the internationally sponsored government is long lasting. This results in that former allies and links to provincial warlords are quietly maintained, while internationally created structures and money is tapped into as well. Neighbouring countries are interested in participating in the opportunities that the reconstruction offers, but at the same time are cautious, because intensifying relationships with Afghanistan would also mean that they are more vulnerable to drugs and arm trafficking as well as ideologies that could infiltrate their borders (Armstrong and Rubin, 2003:35). This lack of intense regional cooperation with countries in Central Asia makes Afghanistan political and economically reliant on countries in the West such as the U.S.

In analysing the political economy of war (1995-2001) and peace (after 2001), Giustozzi (2007) stresses that during the war businesses are created in close alliances with strongmen and warlords in the region. During peaceful times,

the strongmen and warlords themselves transformed into politicians and in order to profit financially, thus became active in business, but mostly not in first person. Politics and economic activities blend in persona of these strongmen and warlords, and the national regional economic situation very much linked to their intentions and visions.

For example Herat province, due to its proximity with Iran, relies on trade and is economically quite stable. As a major trading hub, there always has been a spirit of entrepreneurship, of import and export. In Herat, Ismail Khan could gain influence through religious supporters. He used the economic favourable position to gain immense revenue, which also allowed him to establish himself politically strong. Separate and independently from the central government structures, Ismail Khan strengthened the province by investing in infrastructure such as roads and electricity and created an industrial park. The province benefits from the link to global markets through the near border of Iran and Turkmenistan for example, which Ismail Khan knew how to utilise. Because of the quick development Herat is often named as an example for social development and economic growth. The quite peaceful and secure situation was one factor and the quite stable infrastructure and electricity situation another, why the TU Berlin has decided to provide long-term support for the computer science faculty. Also U.S. commitment in form of the IT-incubator was based on similar assessment. The existing computer science faculty with motivated students and graduates, the stable infrastructure and the economic strong position made Herat ideally placed (Brinkley, 2014).

Herat could benefit from Ismail Khan developing the province and establishing a secure environment. Giustozzi (2007), however, reminds us that the role of strongmen, warlords and politicians in the development of their provinces and their intentions in the development of economic interests should not be overstated. The main objective of the strongmen is the political influence on their territory. Investments were not seen as necessarily profitable, '(p)atronate and the distribution of benefits to gain political support seem to be important aspects of these businesses' (Giustozzi, 2007:79). Moreover, political

influence needs to be maintained through immense costs and efforts, which has until now been a major concern and challenge for strongmen or other politicians.

Similarly, the lecturers in Balkh report that the province is quite secure and the Governor Atta Muhammed Noor is a major guarantor for the security and economic development in the province. As governor, he could consolidate his dominance by joining forces and installing local commanders in his government (Giustozzi, 2012). At the same time, he cooperated with the central government so that he could keep his appointment as governor, which he has held since 2004. Similarly to many strongmen, he is involved in economic activities and he is known for his immense economic wealth. Giustozzi (2007) points out that Atta's relations were with the building industry and his leverage over businessmen was the distribution of land. His influence and his dominance is so immense that most transactions in particular regarding land distribution and real estate, need his approval. Thus, any larger company, organisation or institution like the university is in need of his support. Most of Balkh's economic development is concentrated in the capital Mazar-e-Sharif, but is very much linked to political patronage and allows no space for free competition, reports Giustozzi (2013). The lecturers report that Balkh province as well as Mazar-e-Sharif do not provide job opportunities for computer science graduates. Herat and Balkh, two of Afghanistan's stronger economic provinces provide only limited opportunities for the computer science graduates. They cannot provide the wealth and variety of job opportunities that Kabul does. All foreign offices and all governmental offices, which provide many jobs and thus attract more and more people, are located in Kabul. The city grew immensely and with the major objective of urban development. One of Afghanistan's largest revenue sector is telecommunications and thus, the private sector also offers job possibilities in the capital.

The economic situation throughout the country is still very fragile, with Kabul, Balkh and Herat having more economic stability than the rest of the country. Yet, opinions of the lecturers reinforce the idea that economic activities are bound to political patronage. At the same time, saying that IT is a very successful field with a future, they state that finding a job is only linked to relationships. They open companies, at the same time they state that it is difficult

to make a profit and establish a market, pointing out that only a few huge companies are covering a sector and these companies are related to politicians. Tenders are published through the governmental bodies such as the ministries, and the bidding processes are quite corrupt, with contracts given to the major companies. It is difficult to participate and to win tenders with nor or little political leverage or financial means, so bribery ensues. The conflicting and contradictory statements and actions are quite typical.

Me: There seems a huge demand of technology, shouldn't be there also good job opportunities?

Lecturer: Here, it is not. We don't have IT companies. So most work in working in governmental institutions or in foreign offices. They even pay well.

Me: That is a great development, that graduates find jobs.

Lecturer: Not really. Here everything is given by relations. You need a university degree, but nobody would test your knowledge. Look who gets jobs and where. Student X got a job in Ministry of Communication, he doesn't know anything. But he has some relations, so now he could be head of that office. Or student Y, do you remember he was the worst in his class, almost dropped several times, now he got a job in the ministry.

Me: Doesn't it get better?

Lecturer: Not really. It will change, but it will takes time. It is good to study. But students don't see a future.

(Interview, 14)

There are regional differences which create different job profiles as well as job opportunities. Due to these regional economic disparities, there are differences in the demand and usability of their skills.

6.1.2.2 Private Sector Development in Herat and its Impacts on Computer Science Education

The different perspectives of computer science skills also stem from the different opportunities within the regions. When I visited Herat University after two years' absence, I could see the outcomes of our project, the development and improvements and could feel the different atmosphere. I saw and spoke to the students, who were sitting in groups in the library, in the PC pool. They all spoke English very well. They all asked many questions and were curious to learn more about computer science. The interest and the commitment to the subject were

also physically visible. The lecturers encouraged students in doing projects which were presented publicly in the hallways and classrooms.

The situation I observed in Herat in 2012 came into being through the commitment and engagement of various different actors in different worlds. Herat was the first computer science faculty and has been supported by international actors from the beginning. I was involved at Herat University in 2005 as well as from 2008 to 2010. From 2010 on, the first batch of lecturers with master's degrees returned to Herat University. In the past (2005-2010), our team at TU Berlin had encouraged students to form study groups and implemented a tutor concept and a network administrator group (Mahr and Peroz, 2006). One former student remembered that '[w]hen the team of TU Berlin came, things changed, every student was encouraged and not only the best in the class. This started competition among the students and made us all active' (Informal Conversation 8). At that time, there was a change in the normally established order among students: the grades were secondary and emphasis was on the application of knowledge they learned as well as their engagement in the reconstruction of their faculty.

This new activity and excitement caused a sensation for the Task Force of Business and Stability Operations (TFBSO)¹¹ who approached several universities but decided to establish ties with computer scientists at Herat University. The TFBSO was amazed by the lecturers and students presenting their course projects in English: 'The work was first-class (...) All talented programmers and graphic designers, they had learned state-of-the-art technology and were eagerly hoping to work in the IT sector. But none of them had jobs in their chosen field', remembered Brinkley¹² (2014:289). Two worlds, the higher education with the computer science faculty in Herat and the private sector through the TFBSO initiative, started to interact with each other, which

¹¹ The Taskforce of Business and Stability Operations was formed by the U.S. Department of Defense in 2006 and has the mission to use economic power as a strategic tool for promoting economic stabilisation and security (HOMEPAGE).

¹² Paul Brinkley served as United States Deputy Undersecretary of Defense from 2004 and 2011 and visited Herat University as part of his mission of the TFBSO.

was a new development at that time. The TFBSO saw and reinforced the vision of IT as a driver for development and economic opportunities like many other investors and aid programmes. 'Bangalore as a model for Herat' (Kelly, 2011) developed into *Herat - the new Bangalore*, and established itself as a new vision which is heard everywhere from internationals, governmental representatives, entrepreneurs, private sector, lectures and students. This had impacts on the students and lecturers. The TFBSO established contact between the computer scientists and Google and IBM, which led to the opening of an IT incubator, a highly equipped meeting place for new start-ups with expertise and advice from IBM and Google (Brinkley, 2014:289).

The world which TFBSO offered was very attractive to the students as well as to the lecturers. Companies like IBM and Google hold prestige and personify high scientific competence, so when approaching them, the lecturers and students saw an opportunity to present their activities to the faculty and simultaneously transform their activities into economic as well as social capital, and enhance their scientific competence by learning from experts. Many opened companies in order to participate and interact with the TFBSO.

Interactions between these two worlds started. The IT incubator offered office space and a place where the IBM experts met the computer scientists, who now were seen as entrepreneurs. At the opening of the IT incubator, the Minister of MCIT, the Governor of Herat Province and many other high-ranking locals and international officials took part and gave the IT incubator symbolic value. Competition among the lecturers started to take place. Students and lecturers clustered in their start-ups. They tried to position themselves as the leading company. Only selected companies were supported through the IT incubator. Thereby, all the companies courted the favour of the TFBSO. The TFBSO also invited a group of these businessmen and women to the US to the headquarters of IBM and Google. Access to such resources is always highly sought-after because of their rarity.

Some of the lecturers made use of these new opportunities, while those who did not take part emphasised the negative consequences of the TFBSO. A new grouping of the lecturers took place: those who advocated the TFBSO and

those who criticised it. The critics stressed that the TFBSO extracts capacity and expertise from the university with their promises of potential business and wealth creation. To support their claim, they reinforced the image of a selfless lecturer in service for the country (see 5.1.1), which is in contrast to being an entrepreneur and businessman. By pointing to such socio-cultural norms, they hide their envy and jealousy through these moral statements and draw a boundary between what is good and bad. Such statements are highly influential as they threaten reputation and social position. They present the TFBSO as a force that pulls lecturers away from the faculties and weakens the newly built structures in the faculty because lecturers prioritise and put their energy into their new companies. The TFBSO might have withdrawn the attention of the lecturers, and weakened in this way the academic structures as well as the academic professionalisation of lecturers within the faculty. In turn, the advocates claim that others are jealous because they do not possess the knowledge, skills and expertise that are necessary to be a lecturer, that they do not have the scientific competence and thus point to moral arguments.

Despite the criticism of weakening institutional structures, some lecturers argue that the TFBSO is weakening the development of an academic life and a scientific culture by emphasising only practical and application-oriented developments. Students quickly grasped that practical skills make them more attractive to the TFBSO, and so demanded specific skills in the lecture. Many students started to become interested in programming. They required more training from their lecturers in specific programming languages, because these skills allow them to interact with the world of the TFBSO. Computer programming was seen as quite unnecessary in 2005. The dominant subfield in computer science education was computer networking because of the available job opportunities. With the new opportunities which the TFBSO offered, students required more practical knowledge in computer programming and challenged the lecturers with their demands. Thereby, students were not so much interested in the theoretical foundations or systematic methods of software engineering, but in the practical skills of coding and hacking. Lecturers had difficulties in handling the requests to teach the principles of software engineering in combination with

practical programming skills, for example. Because students were only interested in the programming skills, the criticism has arisen that the TFBSO indirectly impedes the development of an academic and scientific culture.

The following captures the perspective of lecturers about the job situation and its impacts on computer science education. This informal conversation took place when I visited Herat University. I especially met with the recently hired lecturers in the faculty and spoke about their motivations, experiences and plans. We discussed the job opportunities for students and graduates of the computer science faculty.

Lecturer 1: Most students open their own companies.

Me: Great, companies that develop software? Is there a market?

Lecturer 2: Not a huge market, but a little bit. Means some companies need some special software for their accounting for management, something like that. They order a new software and we realise it. This year, we worked on a new product, it will be release soon.

Me: That's amazing. Do students work in your company after graduation?

Lecturer 2: All the members of our company are our students. All graduated from computer science, some are still currently students.

Lecturer 3: I also have a company, but here is the question. Why students open an own company? Like most of the students, I didn't see a place for software development to work, I just worked as an IT manager. Checking the network, checking the internet connection. But my field in university was software engineering.

Lecturer 1: Here in Afghanistan, you can be creative, you have to make your own job. Also, lots of students here build some sort of start-up. They are getting ideas and mostly fourth-year students they are working on their thesis, but actually this is some sort of start-up, some business idea behind that.

Me: That is really good that students can combine both, their thesis and their business idea. I remember times where students came and said I want to learn Windows Server 2005, and they just wanted to have a certificate for that.

Lecturer 4: Now the students have not the same idea than before. They want to learn exactly the subjects in the field of computer science. But they have some expectations from the lecturers. They want to see the projects of the lecturers. They want to see what you created. Their expectations are high, like I have to create software for them.

Lecturer 1: Some sort of proof.

Lecturer 4: But they just want things from us. Now students are more lazy. From the first semester, they want to create software and work in the bazaar and have some money.

Lecturer 3: Lecturer 4 didn't mean that students are lazy, but they want create software from the first day.

Lecturer 4: They don't want the lecture.

Lecturer 5: They want everything in practice. Only practical things.

Lecturer 4: From the first semester. This is the only thing they have in mind.

Lecturer 5: From the first day you go to the class. Ok, we don't want theory, we do practical.

Me: What do you do then?

Lecturer: You have to talk a lot. First, you have to study something in theory and then you have to put it in practice. For example, in my subject it was networking. It was the first semester they want to study network. I told them. You do not know anything, how do you want to work? You have to first study something and at the end of the semester we will have something practical, which you can see.

Me: Did they accept?

Lecturer 1: They always send them to me.

Lecturer 5: Now there is much progress in each session. When we studied here, every semester we had networking, every semester we started again, in the next semester again. IT was just repetition all the time. For all subjects, for Java the same. I don't know anything about Java, because every semester we started again and a new lecturer came and we started again. There was no effective plan. But now it is different. We have the curriculum. We know what we have to teach. For my subject, I had the curriculum they made before the semester. I just go through that and even more, because they did practical part so we added the practical part inside that for the student.

(Interview 21)

The conversation shows the different changing dynamics in Herat. The idea to open one's own company has manifested itself in the heads of students and lecturers. The vision of Herat as a new Bangalore empowered students, made them interested and curious and stimulated demand for training in practical skills and a professionalisation of the discipline. The establishment of the IT incubator has changed computer science education enduringly, even though the IT incubator itself was not that successful. It resulted in the incorporation of practical skills in teaching practices and even within the curriculum. Students use their bachelor dissertation to design applications that can be used within their

environment. After a few years it became clear that the promises given by the TFBSO were not kept. The market for Afghan software products is not huge and the IT incubator is not really in use anymore. The hope and expectation have given way to disappointment and loss of trust in foreign investment and vision. One lecturer describes the difficulties and consequences of the interactions with the TFBSO.

Lecturer 1: Most of them dreaming that next day Google or IBM will come and they become famous and this or that. Because when I came to Herat, they said that Herat will be like Bangalore. This is in their head, that we will be like Bangalore, and that lots of software companies are coming. Last semester I talked to Lecturer 2, 'oh you created a new software, we talked about the software, did you sell it?' But he said nobody is coming to purchase it, because there is a lot of software coming from Iran, people are used to purchase from them. No one in Herat trusts us. Maybe it is not a good software, but we are doing it for our future. Maybe some donor will come and help up. Maybe IBM is coming, maybe Google is coming. Herat will be like Bangalore. It is a dream, now there are lots of companies. In Kabul it is obvious, there you serve the foreigners, here in Herat you have to serve the people (...) But they are just dreaming, IBM is coming and nothing is happening. It is not good live in your dream. The incubator is not really active, the IBM people left, as usual, lots of people are coming and then later there is nothing.

(Interview 61)

Nevertheless, interactions with the world of the private sector and projects like the TFBSO have changed the perspectives of lecturers and students. Simultaneously, these interactions have impacted computer science education, as well as the professional life of computer scientists in Herat province.

The professional opportunities, the jobs availability and also the scientific culture in which students are educated heavily influence the development of the discipline. The emphasis on entrepreneurship, creating own software and creating an own market is specific to Herat. Lecturers encourage students already in their teaching to think project-based or how to create useful and functional software, pointing out that they themselves can support the development of software. Lecturers recognised the potential in creating software. For example, lecturers stated:

The software applications in Afghanistan in the universities for example have lots of problems and I want to solve all these problems. Most of universities have paper-based systems, or still static systems and websites.

(Interview 57)

We know ourselves the best how our systems work and how we can translate them into software.

(Informal Conversation 8)

The entrepreneurial spirit is visible at Herat University. Many students, graduates and lecturers open their own companies and compete in national as well as international bidding of software projects. Additionally, computer scientists started to organise themselves, hosting meetings where they discuss and exchange ideas. Recently, in February 2015, several companies organised an InnovationLab at the university with the goal to find social and technical solutions to social problems. Because most companies consist of students, graduates and lecturers from the computer science faculty, the faculty is a strong connector. They all share a vision where computer science gives them an identity with which they can bring social changes.

This section has presented how students and lecturers are affected by the variety of job opportunities, which influences their vision of what computer science education should look like. Lecturers diverge on how they want to balance the demands of the job market with international standards of computer science education. Thereby, lecturers rely on different partners in translating their vision, as seen in the example of the TFBSO. The next section presents an example of how the private sector influences computer science education.

6.1.2.3 Private Sector Involvement in Computer Science Education in Kabul

The above section described how the TFBSO established interactions between the private sector and the computer science faculty in Herat and influenced computer science education indirectly. The following presents how the private sector directly shapes computer science education.

Cisco, the multi-national technology company, aims to establish public-private partnerships with universities and thus actively seeks connections with

educational institutions. Cisco provides IT skills and career building certificates through their Cisco Network Academies. Cisco's academies have been present in the higher education system in Afghanistan for many years. Most universities have Cisco laboratories where students have access to Cisco's network academy and, if they are interested, can study towards further qualifications in ICT skills. The economic capital which Cisco brings in by investing in computer laboratory equipment and salary for instructors gives the company a significant role.

Some lecturers at Kabul University saw an opportunity in bringing the Cisco network academy into the computer science faculty. Kabul University is the only university where Cisco is actively integrated in the computer science curriculum. The course material of the general ICT skills certificate is part of the curriculum. CCNA (Cisco Certified Network Associate) courses, in particular the *CCNA Routing and Switching* course, are transferred and delivered without changes or adaptations of the teaching content for computer science students. The CCNA courses are characterised by a very practical approach to learning Cisco technology. The emphasis of 'workforce readiness skills' (Cisco, 2014) is attractive for many students. Furthermore, having a prestigious company such as Cisco as part of the reconstruction process within the university is highly sought after. In particular, because companies like Cisco bring economic capital, they are useful for enhancing the social position of the one who is in charge. This means that the instructors of Cisco academies, who are often the computer science lecturers, but also the faculty or university hosting the Cisco network academy, benefit from the prestige attached and the resources brought.

The impact of the active integration of Cisco contents in the curriculum recalls debates on the dependency of technology and science. MacKenzie and Wajcman (1999:6) stated 'technology has arguably contributed as much to science as *vice versa* – think of the great dependence of science on the computer'. Mahoney (1988) and Aspray (1986; 1994) pointed to the relationship between the development of computers and computer science in the US. The comparison is bold, because the scientific system is not so far developed that computer science in Afghanistan is shaping the technology. Nevertheless, the teaching of Cisco devices in the higher education system leads to a more prominent use of

these devices in business and personal life. The job market for computer scientists in Kabul is shaped by foreign offices or governmental offices, which are mostly IT manager or network administration jobs. Many of these offices use Cisco devices, thus education in Cisco devices is beneficial. However, because students are only familiar with these specific devices, the offices predominantly set up systems with Cisco devices. Thus, both are dependent on each other.

In the course of the rapid developments in computer science education, the Cisco programme is often under question. The content is very practical and application-oriented, but some lecturers argue it trains students blindly on devices without an understanding of the general concepts of networking. Others point out the pre-assembled material and simulations, which gives students an excellent insight and opportunity. 'At the end, it depends on the skills of lecturers; some lecturers can only teach from the slides, then students don't learn much, but when you teach then you can also use the material and add enough information that students benefit from both' (Informal Conversation 66). Lecturers often sway between where to set their priorities. They would like to teach and train students on systems and software that is free and open source. In their studies abroad, they studied with the focus on concepts rather than on concrete applications. For example, courses in programming, data structures, system programming, databases and others focus on the principals, techniques, methods and concepts. Focus is on learning and understanding of key concepts, which enables the transfer of knowledge and skills to different programming languages and technologies. On the other hand, lecturers want to teach and train students on technology and programming languages that are sought after in the job market. 'We have to see what our country needs, that's what we have to teach' (Informal Conversation 20). Yet for all the lecturers this means something different. Some prioritise immediate needs, other want plans with more vision and foresight.

The two examples in Herat and in Kabul present how the private sector interacts with the higher education world. In both cases, the private sector influences computer science education and *vice versa*. While at Herat University, the influences were implicit; at Kabul University, influences are explicit. The

different job opportunities might contribute to different developments. As one lecturer described, 'in Kabul (...) you serve the foreigners. Here in Herat, you have to serve the people' (Interview 61). The concentrated presence of foreigners in Kabul created job opportunities in foreign organisations, agencies and companies. Such job opportunities are rare in Herat and graduates and lecturers were required to create their own job opportunities. The different developments led to different prioritisations of skills and knowledge, which is also reflected in the curriculum.

6.1.3 Academic Professionalisation and Scientific Community Building

The previous section has shown that the knowledge and skills that graduates need in the job market have changed over recent years. Several developments have contributed to a professionalisation of skills, for example, the influence of the private sector (see 6.1.2). At the same time, lecturers have understood that they have to respond to the changes and professionalise the discipline itself. One lecturer points out, 'here we are not teaching computer science. Here we are just learning and teaching skills. I want to improve that' (Interview 46). With these motivations, lecturers want to develop the degree programmes further and enhance the level of knowledge and skill sets beyond technician work such as installing PCs or troubleshooting.

Lecturers discuss how they can professionalise the discipline and envision a discipline and a degree programme of computer science that is oriented to international standards. It is only then, when they mention that they want to work scientifically and refer to doing research, studying specialised areas in detail and publishing in journals. They want to enhance their own store of knowledge and be recognised as experts on computer science matters.

While the institutionalisation of the discipline within the higher education system is progressing well, academic professionalisation lags behind and so does the creation of a scientific culture. Institutional development in the computer science discipline is making good headway, which can be seen in the opening of more and more computer science departments and degree programmes throughout the country. Further, the increasing number of students and

lecturers, the higher qualifications of lecturers as well as the access to materials and equipment show the progress made in recent years. Lecturers report proudly and comment on the rapid developments and progress. At the same time, they complain that their authority is questioned on a constant basis and that they feel isolated with their tasks and duties.

What is here called academic professionalisation includes the processes of becoming an academic and the self-training and development of academic skills such as research activities and publishing. Within the literature, there is less emphasis on the professionalisation of becoming an academic that applies to the lecturers in Afghanistan. Becher (1989:52) points out how scientists get trained in the discipline's culture and become members of this scientific culture. Similarly, Rosenberg (1976:230) highlights how disciplinary identity influences the academics' identity of setting problems and defining tools for addressing them. Thereby, the emphasis lies on how scientists defend their territory, develop a new territory and adopt or negotiate the habitus of their discipline. There is less emphasis on how scientists professionalise when a system is in place that marginalises scientific competence, as is the case in Afghanistan. The institutional framework as well as the scientific ethos within the higher education world has been destroyed over the long years of conflict. The escape of the academic elite and missing role models of computer scientists makes it difficult for the lecturers to define their identity. Thus, international models and international scientific systems are reference points to which the computer science lecturers integrate.

Lecturers face particular challenges as the scientific norms that are present in foreign universities do not exist within their universities. The overreliance on social competence and the constant political and social struggles are characteristics of the academic and scientific environment in the higher education world. Further, current power structures are reproduced and give newly qualified lecturers less influence (see 5.2.3). Because of such marginalisation, lecturers, in order to pursue a career in academia, concentrate mostly on the development of their social competence and social capital, neglecting their own scientific training and academic professionalisation. This reflects on the general development of the discipline, its body of knowledge, its

practices and the development of a scientific community. In order to gain an understanding of how computer science develops, the following section highlights aspects of academic life in computer science faculties and portrays the challenges in professionalising the academic discipline.

6.1.3.1 Stagnation in the Academic Professionalisation

The situation among the computer science departments and faculties within the country is quite similar. In order to professionalise the discipline, the primary strategy is the further education and qualification of lecturers. Lecturers seek scholarships to study abroad and enhance their scientific capacity in their discipline. If they received their bachelor's, they are eager for a master's degree. If they have already received a master's, they are eager for a Ph.D. During their time abroad they study hard, but as soon as they return they slowly turn away from any personal scientific training and professionalisation. They adapt to local practices within the higher education system, which most describe as qualitatively weak. Several reasons contribute to the fact that lecturers are distracted from their scientific training, such as the high priority of teaching, the burden of administrative tasks and a less encouraging environment because of bureaucratic hurdles and individual power struggles. Additionally, the environment in which lecturers are embedded has less emphasis and appreciation of scientific achievements from all actors and worlds.

There is a system in place that defines academic ranks, outlines the career of an academic in the Afghan system and aims to encourage lecturers doing research. It consists of six different ranks which are loosely aligned to a received degree but which are also possible to reach through time and other scientific activities.

Academic Rank	Requirement	Translation
Namezad Pohyalay	Requires BSc	N/A
Pohyalay	N/A	Teaching Assistant
Pohanyar	Equivalent to MSc	N/A
Pohanmal	N/A	Associate Professor

Pohandoy	Equivalent to PhD	Assistant Professor
Pohanwal	N/A	N/A
Pohand	N/A	Professor

Table 6-1: Academic ranks in Afghans higher education system

After applying for a lecturer position, lecturers reach the rank of a Namezad Pohyalay (hereafter named Pohyalay), where they teach on probation for one year. After an examination they become Pohyalay and are officially members of the higher education system in Afghanistan. After a period of three years, the lecturers are eligible to apply for promotion by submitting a scientific work. A promotion can be achieved by getting a higher degree (MSc or Ph.D.) or submitting a scientific work (see also quote below). The status of Pohanyar is equivalent to an MSc and Pohandoy to a Ph.D. (Informal Conversation 68).

Opinions about the system are various and contradictory, yet most lecturers talk disparaging about the system in place. The quote below describes the current practices within the scientific system.

A promotion can be reached in time through academic output. That could be a research, translation, authorship of a book, but most of these activities in my opinion are only copying. (...) I give an example for you. Who does know more than very basic English? He or she got very high academic rank based on a translation of a very scientific book. Nobody cares about it, even not our academic council, not on faculty level, university level, ministry level. The council passes and approves her or his translation for academic promotion. That council assigns the candidate to the basic English course. A blind council, it doesn't know. Today my translated book is passed through academic promotion for higher degree of academic rank, and tomorrow I am assigned for joining her or him to an English course and that course is an beginners English course. (...) This is our standard or our criteria, very poor criteria.

(Informal Conversation 25)

The system is criticised and lecturers confirm that quality control is non-existent. It goes even that far that books are translated with Google's translation function and submitted as promotion. I remember a bachelor thesis defence where a student handed in a photocopied chapter of a book and insisted that it is his work and the panel of lecturers even discussed to approve it anyway. The lack

of quality control installs a promotion system that provides nothing more than a better social position and more power and control. Nobody gives real value to scientific achievements, so lecturers 'are discouraged to go on' (Informal Conversation 37), which leads to the neglect of scientific training of lecturers. 'Scientific development [meaning academic professionalisation] only happens on paper' (Informal Conversation 37).

While there is much criticism, there have been few changes taking place in the official system in recent years. The system is entrenched and change is not strongly encouraged by any actor group. This is in opposition to everyone's official agenda, which is to strengthen scientific capacity and competence. In reality, discussions about the implementation of measures are shifted to political arenas and scientific achievements are misinterpreted or disguised so that any evaluation of the scientific capacity of lecturers is impeded. International actors would be a logical alliance in bringing about change, but 'donors and NGOs can support you only with money, nothing else. They do not understand what you need. They concentrate on material things' (Informal Conversation 9). Donors point out that requests from local partners are usually of a material nature, or highlight the fact that grants are specific to certain measurements that do not support scientific capacity building.

Foreign universities have a better understanding in supporting the academic professionalisation of the discipline and the development of a scientific community. There is mutual understanding about goals and objectives because the world of foreign universities already consists of the commitments, ideologies, organisation and technologies that Afghan universities seek to develop. For example, within the scope of this project, objectives of the university partnerships between TU Berlin and some of Afghanistan computer science faculties include the support of the establishment of academic structures and academic professionalisation, as well as scientific capacity building. Supporting academic life in computer science faculties means that, in my role as a foreign lecturer, I collaborate with the computer science lecturers and identify with what and how we can implement measures to reach that goal.

Analysing and identifying the situation is thereby one part. The often mentioned challenges of low salaries, low capacity of lecturers, and lack of access to materials and technologies are easy to identify. The more difficult question arises of how measures can be implemented to remove these challenges. As lecturers, we discuss daily what to teach, how to teach and how to cope with the challenges.

Lecturer 1: I think one of the major challenges is that as a lecturer you do not get a good salary. In the first year you don't get anything and later it is not enough to support your family. Everybody has another job, and teaching in university is not priority. That's why we do not improve.

Me: Ok, let's imagine that everyone gets an appropriate salary.

Lecturer 2: You know they pay 5.000 US Dollar in some companies. Even a translator gets 2.000 US Dollar at the UN without any qualifications.

Me: That's a lot of money. But let's imagine you get that much for teaching. Do you think it gets better?

Lecturer: [laughing] Probably not. Because nobody cares that you give a good lecture or a bad one. Maybe a bit. I don't know.

Me: Well, I think at Herat University additional salary is paid, but there is a lack of transparency and accountability. I think nobody actually checks, if it helps them to focus more on their work and actually do anything. Personally, I think that the additional money is not very helpful. Moreover, it creates jealousy among them, because not all get additional income, or one is doing something the other don't.

Lecturer 2: Well, maybe some do, but most probably not. It is our attitude to be jealous. We always look to the others. Problem is, that nobody cares how you work. As long you get along with everybody and students are happy. Important is that you sign your attendance, nothing else.

Me: I think that there are a lot of lecturers who are actually interested in the field, and they seem so motivated when I meet them abroad. If we could offer something as an incentive for their hard work, then we might can change things and I think a lot of things also have changed over the years. What are the things we want to improve? And how?

Lecturer 3: I would like to get links to international journals for example, so I can read more.

Lecturer 4: Or we can have awards for best teaching.

Lecturer 2: Yes, we are also active. For example, I give the students practical exercises. And I let students present in the class, so that they get more practice in presentation.

Lecturer 5: How about we visit each other lectures, then we can give feedback to each other and we can learn from each other.
[...]

We discussed and brainstormed about various issues and different scenarios, about salary, about the quality of the lecture, the motivation of students, or access to digital libraries and many more. It often came back to the same conclusion, it is the low emphasis on scientific achievements, the lack of accountability that impedes academic professionalisation. It became clearer for us that current practices need to change. Such practices begin with being on time in the lecture, being prepared in the lecture, engaging with students, providing course material, being strict about failing students in exams and many more things. Changing such practices is difficult and is further examined in section 6.2.

Having continuous, long-term lectureships of foreign academics at the faculties can have an impact on the change of practices. For example, in the second term of my fieldwork at the Balkh University, I encouraged study groups and was working with the students and some lecturers on more practical skills such as HTML and CSS courses in the afternoons. It is not a new idea, but the effect was profound. The students got interested and stayed longer in university, which made the lecturers more motivated and they also stayed. Some of the lecturers were not motivated to begin with, but stayed, as they did not want to leave before me. They wanted to demonstrate their commitment and motivation, because they also knew that I reported back to the project manager in Germany. Whether or not they were motivated to begin with, it became a habit that everyone stayed long. We organised lunch together, we worked with the students, but sometimes we just watched some YouTube and laughed and spent time together. Most afternoons, all lecturers from the entire university left when lecture times (7 am to 12 pm) were over. We had the whole university building to ourselves. We all went to the IT-Centre which provided 80 workstations, and enough desks and space to work in groups. We could establish that, in the computer science faculty, students as well as lecturers continued their work. Even if students often used the afternoon times to use the Internet, the students and lecturers built a closer relationship towards the computer science faculty and began to identify with the

discipline. Later in the semester after I left, lecturers and students together started to decorate their classrooms with posters and drawings and started their own small projects. These are small steps, but they can bring changes. Providing the students and lecturers a physical space such as opening the IT-Centre and letting them use all the hardware, strengthened their interactions. I remember that in Herat the chancellor did not give permission to let students work in the IT-Centre as he was afraid, that something would break. The students named the IT-Centre 'the museum', as you could look but not touch anything. One reason why students liked to stay was that we provided a space where girls and boys could interact with each other. Also this evoked controversial discussions. There were people within the university who were suspicious, accusing the faculty of introducing morally bad practices. University is the first time that, male and female are co-educated, but in the lecture they still sit separately, the girls in the front the boys in the back, and there is less communication between them. Thus, the students enjoyed the time in the afternoons in the IT-Centre. Even though they kept quite separate, it was a safe environment to interact. These changes will hopefully lead to a similarly active community like at the Herat University.

The support of long-term lectureships are very beneficial, but are rare. Afghanistan cannot offer much in return for scientifically excellent lecturers from abroad. Thus, there is no continuous interaction with foreign lecturers. Rather, there is a high turnover among foreign lecturers, usually staying for short-term consultancies or short-term courses over a semester or a year. Mostly, foreign universities support academic professionalisation through the sponsoring of scholarships. The idea is to train scientific capacity abroad and encourage them to work as ambassadors in the faculties later on. Furthermore, if foreign universities operate within the country, they do this through projects or self-created structures.

The boundary of the official local system and the international world is essentially impermeable and access is impossible. For example, I have worked for almost eight years with and at universities in Afghanistan and still access is difficult. While it is relatively easy to get a meeting with a minister, a chancellor, or a dean of a faculty, it is hard to join official meetings, committees or other

decision-making bodies. In general, only officially appointed members have access, but even then, there are barriers for foreigners such as language as well as cultural conventions that are difficult to comply. In advancing a view, one needs to have a strong local network to support oneself in order not to run into risks later on. Especially as a foreigner, interfering in local structures can even have personal or professional consequences. This means that change or decision-making can only be brought about through local, academic, officially appointed members. Conversely, local actors do not have access to international structures. The worlds are separated, but with the notion that technologies and practices are brought from the world of foreigners to the Afghans. While the transfer of technologies might be not difficult logistically, the change of practices is.

All actors want to change the practices. Lecturers would like to reform and modernise higher education and they would like to improve processes and practices to counter the marginalisation of scientific competence. They want to change how lecturers are hired, how lecturers are promoted (see Informal Conversation 25), how to teach or how to interact with students (see later in 6.2). A similar desire applies to MOHE; its vision is to modernise education to a high-quality education system that is based on scientific merit (see also NHESP). Equally with international partners, all have the same goal of modernising and reforming the higher education system.

This contradicts what I stated before, that there is less emphasis and encouragement on academic professionalisation. Modernising and reforming higher education systems implies a change of practices, but these practices are deeply embedded and controlled in the local system.

In conversations, lecturers emphasise that professionalisation of disciplines is necessary. They want the higher education system to change but their actions do not demonstrate this. A prerequisite to bringing changes is to gain sovereignty over their faculties which, to date, is not the case in all universities. Specific tasks such as the hiring of new lecturers and the examining of promotions can only be done by lecturers with a specific academic rank which in all faculties except Kabul does not exist. This means that lecturers from other faculties such as science or civil engineering undertake these responsibilities.

Thus for computer science lecturers it is desirable to gain this sovereignty and govern their own faculties. Gaining formal sovereignty is the first step in order to facilitate changes, yet this is not equivalent to gaining scientific authority and does not necessarily mean that lecturers become academically professional.

In faculties where the lecturers' scientific competence is not valued, lecturers deal with it differently. On the one hand, there are lecturers that accept their inferior position within the system. One of them told me, 'I am happy how it is, it allows me to have another job, concentrate there. It is good that they do not allow me to use my knowledge. In the beginning, I was sad, but now I am happy with it' (Informal Conversation 67). He refers to his experience when returning from the master's degree and teaching was only offered for him for Microsoft Office courses in other faculties. Another lecturer is more critical. 'The oldest lecturers with the less knowledge they always take the most difficult classes, how will students learn something? We do not professionalise; we are stuck' (Informal Conversation 37). Impeding other lecturers from gaining experience by not allowing them to take responsibilities are mechanisms that keep scientific development marginalised.

At the same time, lecturers notice that a professionalisation of lecturers has taken place. There is much teamwork during their postgraduate studies, where the lecturers can see and observe the skills and developments of their colleagues. They realised, the more recent the acquired qualification of lecturers, the *better* the knowledge they come back with. Because lecturers do not further pursue scientific training, they do not professionalise once they return from their studies abroad so the knowledge gap between lecturers is widening. Thus, the emphasis to give more importance to scientific competence would affect not only the lecturers whose qualification date back many years but also those whose qualifications are only a few years old. They do not explicitly state that this is a potential threat, but when lecturers meet they avoid talking about scientific topics, choosing instead to show off their institutional progress. They themselves reinforce an atmosphere which marginalises scientific curiosity and academic professionalisation.

The lack of scientific curiosity is visible as a disinterest in scientific research. While scientific research might have a minor role within the higher education system, research activities are necessary when lecturers aspire to a Ph.D. degree. There are various scholarship schemes for MSc degrees, but only a small number of Ph.D. scholarships dedicated for Afghan lecturers. Lecturers have to search actively for scholarships and in some cases the lecturers have to compete with academics worldwide. At this point, they realise that the requirements for a Ph.D. are different and that all sponsors require a research proposal. Lecturers struggle in preparing such a research proposal. During their master's education, they were trained in basic concepts and specific skills, but scientific working, methods of abstract thinking or creativity have not been refined. After returning from their master's, they did not pursue research activities or further develop their academic skills. The lack of research experience means the lecturers struggle in developing research ideas, identifying research areas or formulating research questions. They received some training during their master's education, but a master's degree cannot compensate for the many years of rote-learning and constant reproduction of knowledge which they internalised in school. Many of the lecturers do not understand what is asked of them and are unable to formulate research proposals. They have nowhere and no one to ask for help and support. Once lecturers' scientific competence is formally certified by graduating from a master's programme for example, asking for help would imply that one is scientifically incompetent. To acknowledge one's knowledge gaps would threaten their scientific as well as social authority. This makes it almost impossible to ask for help, which leads to lecturers not developing research skills. A Catch-22 situation from which lecturers have difficulties escaping.

One option is to involve persons outside the local system, but here again, trust and respect are important. As a person outside the Afghan system, I have been asked for help on how to obtain a Ph.D. Such conversations start in general by asking which topic I think would be good for a Ph.D. When delving further into which research areas they are interested and what kind of scientific puzzles they see, the answers are interests in databases, security, networks or software

engineering, thus very broad and I am asked to provide them with a concrete research topic (Informal Conversation 6). The topic itself is not in the foreground and often the motivation to receive a Ph.D. is not about the questions to be answered, it is about doing a Ph.D. with the title as an outcome in the form of cultural capital. Motivation is not concrete and not based on individual interests. Moreover, research questions are often adapted to what others tell them to do.

The difficulties in formulating research questions do not only stem from a lack of interest and an inability to do research. Scholarships are preferably given with topics of regional context. Thus, most of the research proposals are ideas to implement systems that are potentially useful for their country or their universities. Their role as lecturers to be a useful recourse to their community, international development practice that stresses the application of technology to bring social change and the government's national development strategy to modernise and digitalise administration, all these ambitions contribute to the idea that the responsibilities of computer science lecturers lie in supporting IT solutions or in maintaining IT solutions that are mainly transferred through international development practice. The problems and challenges of the implementation and adoption of ICTs in developing countries are the same problems and challenges with which lecturers are confronted, but these problems that lecturers encounter in their daily life are not scientific puzzles. They are confronted with social and political power struggles on the one hand and on the other hand are professionally responsible for ensuring the successful adoption of IT systems.

Additionally, funding bodies are eager to provide scholarships but they prefer research linked to the context of Afghanistan. Lecturers stress this might work well in subjects like social and political science, business or law, but not in computer science. Doing a Ph.D. in computer science in foreign countries is about working on scientific research questions there. Foreign universities do not engage in what Sutinen and Tedre (2009) label 'constructive research', developing technology for a known problem within the context of developing countries. Eventually, lecturers communicate to their funding bodies that an Afghan-related topic is scientifically unacceptable, and they aim to distance

themselves from regional or national contexts and strive only for abstract computer science related topics. This leads to further questions, such as how this gained knowledge can be applied when they return (see also 6.2.3).

Lecturers are quite often in contradictory situations which are challenging to deal with. Socio-cultural norms hinder their academic professionalisation in order to maintain social order, or threaten their reputation if they ask for help. At the same time, lecturers reproduce these conditions because social competence is still superior to scientific competence. This leads to the stagnation of academic professionalisation. It impedes lecturers' participation in the international higher education system for their further education such as a master's or a Ph.D. The discrepancies between international and national higher education systems are severe. Not only is the scientific culture different but international disciplinary communities share different goals, activities, problems and methods. Nevertheless, lecturers are motivated to change their environment and are slowly organising themselves, as seen in the next section.

6.1.3.2 Building Scientific Communities, Meeting at Conferences

International actors do not have much direct influence on the local higher education system as they are excluded from official decision-making positions, but they have indirect influence through the establishment of independent projects and initiatives that take place within the universities or faculties. In this way, international actors facilitate the formation of smaller worlds that comprise the shared goals and activities of the projects in which lecturers work. In this way, they are able to influence local structures and practice indirectly.

In the US, the ACM is an organisation which brought interested professionals and academics together in order to discuss the nature of computer science and how computer science education should look (Ensmenger, 2010; Gupta, 2007; Knuth, 1972; McGuffee, 2000; Mulder and van Weert, 2001; Tedre, 2006). In Afghanistan, international organisations mainly bring academics and professionals together. Yearly conferences and training abroad aim not only to impart new skills but also to foster collaboration and offer platforms where the

lecturers can work together in their goal towards better computer science education.

Within the ongoing reconstruction process, the international community provides financial resources to offer opportunities to hold conferences, training and projects through a variety of donors. With the fear that this will change in the near future, everybody within the local system stresses the importance and necessity of it. Despite the request for projects and initiatives that support the establishment of computer science, there are contradictory positions taken by the lecturers. On the one hand, lecturers want to take part in all of these projects and there is huge competition for training places, conference participation and scholarships. On the other hand, these initiatives are often not taken seriously, are not appreciated, are criticised and are even torpedoed.

Growing up in such an aid-dependent environment adversely affects people (Informal Conversation 24). One lecturer compared how the environment has changed since 2005. 'We were working without money [in 2005]; we were brushing toilets and cleaning carpets. And they [new lecturers and students] don't do these things. They have everything, and they ask for more.' (Informal Conversation 24). Over the years, development practice within the reconstruction process has changed. The number of consultants, experts and development workers grew and similar projects grew with larger financial volumes for materials as well as operational costs. The number of workshops and trainings increased and Afghans now rely more on partners and their support. 'Firstly, one [meant is a foreigner] should come there and tell us how to do it, how to reach things' (Informal Conversation 14) said one lecturer, when we talked about integrating more practical exercises in the curriculum to prepare students for the job market. The given support has often made lecturers passive and yet demanding at the same time. Problems are asked to be solved by others rather than by oneself. This can be observed through the constant request for workshops and training in order to get the expertise from the world of foreigners. Yet there are contradicting positions taken. Foreign initiatives like workshops, trainings or conferences are heavily criticised as well.

I don't know why they don't do a video conference. The meetings are not technical, what should we do? So we do not discuss anything. We stay in one room and pretend to do something.

(Informal Conversation 43, about training sessions abroad)

Lecturer 1: Conferences are interesting, but not very concrete. They are not changing anything. There is no result. Just talking. That's why no one is interested. If people are coming, they are just passing their time, they get lunch.

Lecturer 2: Some people say this conference is redundant, no one does something practically.

Lecturer 1: In Afghanistan everyone is always talking.

Lecturer 2: Talking is a lot. In every dimension, political, education, social.

Me: But you can change this now. You are many so that you can work together.

Lecturer 1: Actually lots of change happened. We are working together. Things will change.

(Interview 61)

In the literature review, it has been highlighted that meetings, workshops and conferences are places where scientists meet and that this can function like a trading-zone in which scientists interact and negotiate vocabulary, methods, concepts and models and form a scientific community (Clarke, 1997; Galison, 1996; Strauss, 1978; Wenger, 2000). Bourdieu (1975:19), however, stressed that scientific communities are worlds where struggles take place to gain scientific authority, in which 'technical capacity and social power' are linked to the 'capacity to speak and act legitimately'. Such battles can be observed in Afghanistan.

Lecturers criticise that initiatives such as training and conferences are not very productive, that much is talked about but nothing changes. It is the way people talk with each other, or even how they do not talk to each other. 'It doesn't matter if you really have to contribute something, important is that you have your say in the discussion' (Informal Conversation 37). Thus, conversations are not targeted at reaching a conclusion, they are a demonstration of authority and influence and a demarcation of territory. 'Last time, I said that I don't want to present at the conference. But my colleague said, it is good to show off. (...) It is difficult to present your topic, because of the target group. The people who are in

the conference, they do not understand maybe the technical things that you are presenting' (Interview 61). Lecturers understand what conferences are for; it is not primarily about a scientific exchange and learning from other experiences, it is about representing oneself, representing the faculty and positioning oneself. Participants take and make phone calls, enter and leave the room, talk loudly on their phone calls. Often, it does not seem that anyone is even listening. Thus, in the questions and answer session, completely unrelated questions are discussed.

In the scope of our project, there has been a collaboration between the MoHE and the TU Berlin to support an annual conference on 'IT in Higher Education' since 2005. Ministers of the MoHE and MCIT, University chancellors, computer science deans and lecturers, IT representatives, donors and representatives of the private sector take part in a two day conference about IT in the higher education system. The objective is to bring stakeholders together and facilitate a discussion about the use of IT, but it is used strategically to strengthen positions in the public forum.

The statements of the lecturers do not reflect that their conferences have influence on the body of knowledge they are creating. Lecturers stress that discussions are used to demonstrate influence on scientific matters, but through social and political power.

At a workshop about IT infrastructure within the MoHE, the goal was to discuss the progress and further developments of Afghanistan's Research and Education Network (AfgREN). In a room full of IT experts and computer scientists, the discussion was a mix of many different issues, but few scientific. Everyone wanted to take part in the discussion and started with comments and complaints. Issues discussed in length were about the name and its abbreviation. Questions were asked: Who gave the name, and why it is AfgREN and not AFREN as it was proposed a few years ago? Who chose the constellation of the steering committee? Complaints were reported about the donor's choice of local partners, as well as about the involvement of other ministries like the MCIT and who would be in charge. 'Some wanted to make the discussion political, but I reminded them. "We are scientists, and we are academics, we do not discuss things from outside. These are political issues, don't do this!" Everyone was so unhappy from me when

I said that. You have to be strict. Blaming this person or that person, blaming this donor or that donor. There was too much talking. We need to rethink what to do' (Interview 38). In the international development environment, the focus of many workshops, trainings and conferences includes the coordination of national and international interests, which opens up space to diverge from scientific issues.

In the end, there is less discussion and less collaboration just for the sake of knowledge exchange. These meeting places, conferences, workshops, trainings and other assemblies are used to act strategically to strengthen one's position. The constant regrouping is based on strategies to 'keep everyone happy' and at the same time 'not to trust anybody'. This impedes insight into the constantly changing dynamics, what is often called 'having a double-face' or 'multiple faces'. Establishing scientific communities in an environment which is so political, where scientific matters do not weigh much and where there is no trust and the dynamics are difficult to capture is problematic for all involved parties.

As I mentioned in a previous point (6.1.3.1), lecturers avoid talking about scientific topics among themselves. The above shows that discussions take place, but often it is rather about strengthening social position than a scientific exchange. Partially, this is because there is mistrust that someone may discover one's knowledge gaps, which would put their authority in question. Indeed, lecturers probe others to show their authority. Additionally, lecturers are protective with their knowledge. Knowledge is a resource which, if shared, loses its value. All this contributes to the fact that lecturers do not experience a safe environment where they can learn from each other. Discussions are either not about scientific topics or are superficial and full of buzzwords to impress others and gain dominance in the particular social world.

Many lecturers point out that they feel alone in this environment. 'In Afghanistan everybody is isolated. The situation is like this. When we look abroad, it is important to talk to other lecturers. Find out what is their experience and get their experience. This will be so nice if we had links to other universities. Here we have a lack of communication. This is the problem' (Interview 33). Another lecturer mentioned, 'It will be very useful to see other faculties. In Afghanistan everybody is isolated. They don't like other people, join other

faculties. Working in one place, Afghanistan is like this' (Interview 30). Despite the many connections and relationships which lecturers maintain, most feel isolated rather than a member of a community.

Right at the beginning, the lecturers stated how useless conferences are, but at the same time stated that there is change. Such contradictory statements demonstrate how conflictive feelings the lecturers have. They can feel their scientific competence often questioned or marginalised, but in fact, even discussions are less scientific, lecturers meet and interact at these conferences, workshops and trainings and discuss scientific topics. Over the last few years, I could observe that the language that lecturers use at these meeting spaces has slightly changed. Even though the outcome and the mechanisms of how they interact at the conferences has not changed much, the topics have become more detailed, more technical and more scientific.

Additionally, lecturers started to organise conferences and workshops in their faculties with their students. In this way, students get used to doing presentations and learn how to talk about computer science topics. The more familiar the lecturers become with giving presentations, either talking about them or organising them, the more critical it is to get the system in place, but it will take some time before conferences become a constructive space for knowledge exchange or community building.

6.1.4 Curriculum Development

As pointed out at the beginning, the curriculum presents how a discipline is seen and should contain formalised knowledge and skills so that graduates can enter the job market successfully and at the same time fulfil the standards of computer science education internationally, allowing them to transfer their skills and knowledge to other systems. Scientific communities or conferences are initiatives not only to develop a scientific culture and environment, they are spaces where dialogue and exchange can produce a common understanding of computer science as a discipline in the Afghan higher education system.

The MoHE aims to standardise computer science education. Conferences, such as the annual IT conference at the MoHE, have been utilised in the past to

foster dialogue and work on a standardised curriculum. A standardised curriculum would contribute to a consistent quality and level of computer science knowledge among the national faculties. It would ease national academic transfer and international exchange. Yet the reality in faculties shows that they are not so interested in creating common standards, rather every faculty believes in their model and would like to set this as a standard. The competition among faculties and universities becomes very apparent. As usual, the development of the curriculum is a political rather than a scientific or academic issue.

The curriculum holds political and symbolic value, thus faculties want to demonstrate their dominance by either pointing out the weakness in other faculties' curriculum or presenting their own curriculum as the best solution. Others complained that it is difficult to bring about changes in their curriculum because of the bureaucracy in the relevant departments of the MoHE. These departments have pointed out that faculties cannot make arbitrary changes and that the regulations of the MoHE need to be followed. The whole discussion demonstrated how decisive it is to possess and use one's social power in the whole process.

The way how we develop anything [meaning the curriculum] is like that. Here there are some of our faculty members, who are more educated or active, they make a committee and develop something and make a discussion on the topic. The basis how we made the curriculum is mainly based from IEEE/ACM [curriculum]. (...) We think also that the needs of these two societies [IEEE/ACM] are also good for Afghanistan, because it [the curriculum] covers a lot of things. Understanding, theoretical basis, and a bit general [topics]. Maybe the method [the curriculum] of TU Berlin is not very well suited for a country like Afghanistan. Because it is not an underdeveloped country. I do not criticise the method of TU Berlin, because Germany is the best and established country.

(Interview 35)

This quote shows how faculties try to demonstrate their dominance and defend their work. The lecturer referred to the curriculum that the TU Berlin developed for Herat University, which is also implemented at Balkh University

and Qandahar University. Some Afghan universities base their curriculum on the recommendation of the IEEE/ACM association and distance themselves clearly from what Herat University is doing, but often these are not decisions based on scientific evaluation. Looking back at the history of the creation of Curriculum '68 of the ACM, which is still the foundation for many countries, it is traceable that the IEEE/ACM curriculum is the basis for computer science curricula in Germany as well. A localisation of these recommendations has been done in the past in German computer science education and all universities in the US and in other countries have contextualised the curriculum of the IEEE/ACM. The quote shows that any discussion about the curriculum is rather about dominance and control than about their own academic affairs. Their own achievements and activities are emphasised and defended. The lecturer continued, as follows.

Lecturer: So it is a nice collection of information [the ACM/IEEE curriculum] which gives our students lots of skills and knowledge so that they can adopt themselves in the future work and study life. Until now our students are more successful than in any other faculty.

Me: How do you measure success?

Lecturer: As I told you, we don't make scientific research in here. We measure the success of our student in their jobs. The employers are really satisfied (...) Unfortunately, some of our colleagues [in other universities] they are not well prepared. A lot of their knowledge is narrow in field of computer science, a lot of them are not able to make anything in real, I mean in practice. They just come from weak universities [name of universities are deleted], and make some MSc degree, and now they think they are very knowledgeable and can speak about everything

(Interview 35)

Again, there is no scientific discussion or exchange; it is about defending one's own and the faculties' authority and position. When I visited the different faculties and talked about the curriculum, I spotted how similar they are. But nobody really evaluates or compares the content of other available curricula, not in the world of foreigners or in the world of higher education. The curriculum is rather used as an object to demonstrate scientific authority and all actors involved push for their own version.

Does the curriculum then reflect the body of knowledge or what lecturers think a computer scientist is in Afghanistan? It seems that only a small fraction of lecturers, based on their social position rather than their scientific expertise, participate in the design of the curriculum. The orientation and vision of newly qualified lecturers, in particular, are not included. Additionally, the curricula design is based on international curricula and has often not been localised to the capacity of students and lecturers, to the material available or to the demands of the job market.

The curricula in the faculties provide plans of what should be taught in which semester. The curricula formalise what the body of knowledge should be. Yet the implementation of the curricula in the faculties shows the huge discrepancies between what is written in the curricula and what knowledge students graduate with from their faculties. The challenges the lecturers experience when teaching computer science in the faculties, is discussed in 6.2.

6.1.5 Summary

What is a computer scientist in Afghanistan was the question asked. This section has demonstrated that the image of a computer scientist has been shaped by many different worlds and has developed over time. Thereby, the curriculum as a formal representation of the knowledge and skills that a computer scientist should have has been utilised to show how lecturers construct their image and vision as well as how they contribute to curriculum development. In this section, the interactions between the world of foreigners, higher education and the private sector have been highlighted and show how these worlds indirectly or directly influence each other.

Lecturers aim to contribute and get involved in realising their vision and orientation, which they mostly obtained studying in foreign countries. Not all lecturers are able to participate in the construction or adaption of curricula within their faculties. Those who can contribute are able to give the discipline an identity and they identify even more strongly with the developments in their university. They are more encouraged and motivated as lecturers.

A strong identification with computer science could be found in Herat. As a result, the TFBSO saw business opportunities and established an IT incubator to support students and lecturers starting their own businesses. Such initiatives have influenced the ideas and vision of students and lecturers of what role computer science can play in Afghanistan. Lecturers have to position themselves and decide how they translate the demands of the private sector into their teaching and balance this with incorporating international standards of computer science education. The emphasis of the private sector on practical skills made students as well as lecturers adopt more practical approaches. At the same time, lecturers try to teach to international standards. The differences between the demands of the job market and standards in computer science education bring challenges for them.

When lecturers return from their studies abroad, they are eager to implement their newly gained expertise. This is not a smooth progress, as the changes they would like to see are highly contested (see also 6.2). The recent environment does not encourage lecturers to concentrate on their academic activities. A hierarchical social structure is reinforced which does not evaluate or value scientific competence. The section presented the situation of lecturers and showed how structural constraints and social norms make the system inflexible, so that the institutionalisation of the degree programme progresses but the scientific and academic environment makes it challenging to create.

For the institutionalisation of computer science, the development of a curriculum is central, as it provides the framework for how computer science education will be conducted and what knowledge areas are to be prioritised. Any curriculum in Afghanistan is derived from or developed by a foreign country. Some are based on the ACM/IEEE, some on the TU Berlin, others include mixtures of other universities. This shows the strong dependency of computer science on the discipline and degree programmes abroad. In standardisation processes of the computer science curriculum, different worlds try to gain authority over how it should be developed. It is a political process which has been discussed in conferences and workshops for many years.

Many discussions and struggles are going on in which computer science lecturers express their identity. Lecturers wish to gain a stronger voice within the higher education system and they want to have a say in what constitutes a computer scientist in Afghanistan. The initial situation for computer science lecturers was not easy to begin with. They started their work in an environment without any role models or frameworks to orient themselves other than international models. The participation in implementing their vision and ideas varies from university to university. The robust structure of the higher education system suggests that institutional development will continue, but academic professionalisation will lag behind. Despite the lecturers' involvement in curriculum development, in the end, lecturers are the ones who teach in the classrooms. Thus, the formal curriculum, the influences of private sectors, foreign agencies and universities and their own experiences and vision have an impact on the body of knowledge they are creating as well as the methods and problems they are tackling and, later on, will teach to their students.

6.2 Bringing Computer Science to the Classrooms

This section focuses on the lecturers and how they translate their vision and expectations into the classrooms. Thereby, the focus lies on the lecturers and the students and their interactions. Central is the understanding of how computer science gets established by focusing on the practices that become established through the interactions within the arena of computer science developments. Following Clarke's (2005) framework, practices get established through individual or collective action and are shared within a world.

The objectives of the higher education world, the world of foreigners and the lecturers themselves, all are directed towards reaching high-quality education. When I asked the lecturers what is needed to reach that goal or how they think they can improve the situation of computer science education, the answers were mostly the same. All agree that the situation changes when lecturers are better educated and more scholarships are available for lecturers.

The lecturers' reasoning is that high-quality education can be reached by providing scholarships for a *good degree*, with the degree they receive *good*

knowledge which translates *into good teaching* and thus into high-quality education¹³. This linear approach is internalised by all lecturers, moreover by all actors.

Why the belief in this model is so pervasive and persistent is here examined by focusing on how the lecturers teach computer science. Lecturers want to bring changes to the higher education system. Many point out the 'backwardness' of the higher education system and want to be part of the modernisation of computer science education or higher education in general in service to their country.

Providing master's or Ph.D. degrees to lecturers in order to improve the quality of education and modernise the education system sounds logical. Postgraduate education will lead to knowledge gain of lecturers, but the question of the applicability of such kinds of knowledge needs to be at the back of one's mind. In particular, as postgraduate studies take place in foreign countries, the question comes up of whether learned knowledge and skills can be usefully applied. A transfer of knowledge and skills requires a localisation of practices.

This section consists of three parts to unpack what lecturers referred to as *good teaching, good lecturer and good degree*. The first part of this section identifies ongoing processes and gives examples of how teaching methods and teaching content become established in the classrooms in an interplay with students as well as the administration. Thereby, it describes what *good teaching* means for the lecturers. The changes, for example in teaching methods, which the lecturers anticipate to reach *good teaching*, are explored.

The second part focuses on the challenges in the implementation of these changes. What lecturers establish as *good teaching* is often incompatible with what is seen as a *good lecturer*. Drawing back on the social position of lecturers within the higher education system (see Chapter 5) and the norms and values associated, a good lecturer is a figure of authority who is engaged in the

¹³ The adjective *good* has been used by the lecturers, thus throughout the chapter I refer to *good* degrees, *good* teaching and *good* knowledge.

community and society, but the anticipated changes often create disruption and require uncomfortable changes. Thus, often what lecturers consider as *good teaching* is not necessarily associated with being a *good lecturer* in the mind of students; at least, not yet, but because lecturers' reputations are important in maintaining their social position, challenges are inevitable if students think the lecturer is *bad*.

This leads to the last section (see 6.2.3), which presents how lecturers cope with these challenges. In order to implement their visions of *good teaching*, the lecturers ask for further qualifications. A further qualification such as a master's degree or Ph.D. will provide the lecturers with scientific authority, which they use to counter any attack on their reputation. The objectives of lecturers are discussed to determine why they want to pursue a further degree. Thereby, it will be examined what a *good degree* is in the mind of the lecturers.

6.2.1 Good Teaching – Teaching Well

In the following, the students, who have been identified as silent actors (see 4.1.1), are more concretely introduced. Students are actors who are studying computer science and interact with the lecturers on a daily basis. The lecturers' motivation to *pass on* or *share* their knowledge and conduct '*good teaching*' is directed towards the students (see also 5.2.1). *Good teaching* is associated with 'be[ing] more efficient' (Interview 46), 'be[ing] more effective' (Informal Conversation 21), 'helping students a lot' (Interview 48) or 'instructing students well' (Interview 53). There are diverse opinions what it means to teach efficiently, effectively or well, but there is a common understanding of what *bad teaching* means for lecturers.

When lecturers describe *bad teaching*, they point to other faculties which still implement *old-style teaching methods*, referring to the older generation of lecturers who teach very authoritatively with a teacher-centred style. It is still common practice that the lecturer stands in front of the class and reads from a script. The lecturer reads one paragraph, repeats it and then the students repeat the paragraph word for word in a group. This procedure continues until the end

of the lecture. In the exam, questions are asked which can be found verbatim in the script, thus rote-learning is a method for being a successful student.

‘They only ask facts in the exam. They never ask the students how to apply this or how to use it. In the university, most lecturers like memorising and write not anything different than from the book or textbook, or whatever they have. If there is something different, they will subtract points.’

In my curiosity, I asked ‘How did this style of teaching come to take place?’

‘I don’t know. But it was different in the past; my father, he studied at Kabul University. They had everything. The system was different, because of the civil war everything changed, there were no labs and people anymore and then lecturers became more incompetent and incompetent. In the past, we had science here.’

(Informal Conversation 41)

The younger lecturers smile when they talk about these practices, even though most of them have been taught like this, so when they are talking about *good teaching*, they want to distance themselves from these old *backward* practices. Computer science is particularly associated with an image of modernity and progress, and the lecturers want to be modern and progressive. Most have studied in foreign countries and would like to play a part in the modernisation by contributing their experiences and ideas. Thereby, they not only emphasise computers and IT as objects of study, they also see the use of IT in teaching as beneficial.

6.2.1.1 Change - Lecturers and Students

In conversations with lecturers, we often talked about change; change that already has taken place, as well as change that needs to happen. Characteristic of these conversations were the antithetical responses of the lecturers when talking about their faculties. Lecturers were either very enthusiastic, describing the rapid changes, their vision and achievements already implemented, or they expressed their disappointment and discouragement and the challenges they were facing (see also 6.1.1).

At the beginning of conversations, lecturers point out the positive changes and the hopes that have become reality. For example, when I asked a lecturer about his feelings after finishing his master's degree.

First of all, I am optimistic about it. As we see [When we compare], the year I studied [for] my bachelor's with this year at the computer science faculty, it is getting better. Firstly, the laboratories, and also the lecturers. When we were students, the lecturers were not that active and didn't have that much experience. Also, they didn't have a master's degree. Now it is getting better and we have lots of computers there. But still we have shortages, we don't have a library - a digital library - but the laboratories are good, the lecturers are getting better. When I go to my faculty, I have a great feeling. I go there and I want to share all my experiences, not only theoretical, I want there to share and apply what I did during my master's.

(Interview 61)

All lecturers stress that changes have happened in their faculties. There are the infrastructural changes, but even these changes presented a change of attitude of lecturers as well as students. At Herat or Balkh University, the walls were plastered with posters about the history of programming languages, pictures of students working on projects and a gallery showed the history of computing. Lecturers and students stated clearly through these posters and projects that these were the rooms of a computer science faculty. The universities in Kabul are not nearly as decorated, instead the lecturers point out, that everyone teaches and learns quite focused and then follow their own part-time jobs. It is not a place where students hang out and spent time in their free time, like in the provinces (Interview 35). Yet, all lecturers talk positively about the developments in the faculties. Together with the students, they created their own world, the world of computer science.

At the same time, the lecturers describe the difficulties faced when they are newly hired or returning to their faculties after their studies abroad. They observe that their expertise is ignored or not appreciated. They complain that, with their workload of up to 16 teaching hours per week, high-quality teaching is impossible. They point out that they are sent into the classrooms without any training or preparation. The rapid changes since their own education compared

to the classes they have to conduct become apparent. 'What we have studied over many semesters, we have to teach in one semester' (Informal Conversation 21), reported one lecturer, while another lecturer stressed, 'I am now teaching in 8th semester, when I go to the class, the students are exactly like in the state I am in. They will graduate soon, most of them have the knowledge maybe more than me. When we compare ourselves, we are not much ahead' (Informal Conversation 21). These statements reflect that lecturers recognise the changes in the student body. Thereby, in every faculty change takes place at a different pace.

A crucial factor is the number that is needed in the *konkur* to study at the different universities. For computer science, Kabul University is the most preferred study place and for admission a high number is needed in the *konkur*. But also Kabul Polytechnic attracts more and more students. While Kabul attracts students from throughout the country, the universities in the provinces are mostly attended by students from the surrounding areas. In Herat, there is a much higher number needed in the *konkur* than in Balkh for example, which lecturers explain by the fact that the faculty in Herat has been in existence longer than the one in Balkh. In contrast the number in the *konkur* in the universities in Khost or Konar is significantly lower. This has an impact on the student body, which the lecturers have to teach. The quality of school education has an effect on how the student will perform in the exam, as the questions are the same nationwide. Thus, students from smaller provinces who have a qualitatively weaker educational background generally score lower than students in the larger cities. The high number in the *konkur* in Herat means, that mostly students from Herat city are in the class, and also that students are the best in their region and are often more motivated, as they have chosen to be in computer science. A lecturer at Herat University describes the student body as the following:

There were lots of changes (...). The curriculum is the same, but the syllabus has changed; it is now clear what needs to be taught to the students in each hour. We as lecturers need to focus only on the practical side, need to decide what students need to practice, the slides need to be distributed. Students have changed a lot. They are motivated, they are talented and they are skilled. (...) The students this year, they expect more from their teacher. They ask

more. They do prepare, so teachers have to do more preparation, really students have changed now.

(Informal Conversation 20)

The lecturer in Herat stresses the changes, because when he was a student and, when I was teaching at Herat University the situation was different. At that time, the number of the *konkur* was low, and most students were assigned to computer science, rather than choosing the subject. Many of the students wanted to study medicine, law or languages, but did not have the score to get into these subjects. Computer science was one of the lowest, and the students were quite weak.

A similar situation presented itself at Balkh in its first year, 2011. Since then the number to get into computer science has been risen, but it is still lower than in Herat. Lecturers explain that the faculty is still quite new and because there are no graduates yet, it is not known what exactly happens there. Even when I told lecturers in other faculties that I was teaching in Balkh, they were surprised that a computer science faculty existed there. The difference between provincial students and students from the city can be seen in the first semester, as, the students from the provinces generally come into contact with computers the first time. Introductory courses teach them how to turn a computer on and off, how to use a mouse and introduce them to the Microsoft Office package.

In Khost for example, the situation is even more dramatic. Students who perform well in the exam, prefer to study in Kabul or in Nangahar, as the quality is better and the economic opportunities are larger there. Rarely, they chose Balkh, because of language barriers, as predominantly Pashtun province, they choose to study in other Pashtun province such as Nangahar for example. Thus, the students who study in Khost are weak. A lecturer from Khost criticises the fact that students choose computer science without knowing what this subject comprises and that these students then create problems because their expectations are not met.

Most of the students have chosen computer science, but they didn't know what computer science is. I am sure they didn't know. They don't know what they will study in computer science. But they see that there are lots of jobs in computer science. But

students do not know (...) Actually, this year I have seen so many students, they have attended computer courses. They think computer science is about [Microsoft] Office. Now they are so disagree with computer science. They do not like it.

(Interview 30)

In universities where computer science has been established for a longer period, students have their own image of what computer science is because they have talked to graduates or other students with more semesters. In newly established faculties, students are unsure about the content and its applicability. When I taught at Balkh, I could feel the insecurity of students about the necessity and applicability of the subjects I taught as well as their suspicion about my teaching methods.

The longer a study degree programme has been established, the better qualified are the students who apply for the study degree. Additionally, the school education in general has improved which contributes to the fact that more recent cohorts are often better students than the older ones. 'Each year, the new students get better, because the school system gets better' (Informal Conversation 19). For example, 'the 2nd semester is better than the 6th semester' (Informal Conversation 20). This is problematic, because also among students a hierarchical structure is important, where older students lose face in front of younger students when the younger ones outperform them.

It is challenging to teach such a diversity of students. It requires many adaptations and comprises to what lecturers envisioned and to what they actually can do. Lecturers not only have to decide and consider how they can change their teaching methods, they also have to consider the implications it has on their social position in cases of resistance from students, which is not unusual (see later 6.2.2).

6.2.1.2 *Changing Teaching Methods*

In their wish to modernise teaching methods and distance themselves from old practices, lecturers would like to change the way they interact with students. Students should not be passive receivers anymore; they should take a deeper look into computer science subjects. In an earlier quote, one lecturer described

that in the last few years lecturers have changed from being inactive to being active (see at the beginning of 6.2.1.1). Being active means to engage with students, to teach students more than what is written in a script. Giving students something practical, something useful that is more than learning information by heart for the exam is the lecturers' objective (Informal Conversation 20; Informal Conversation 21; Interview 46; Interview 54; Interview 59).

Already in 6.1.2.1, in a conversation among the lecturers, it became apparent that there are negotiations between students and lecturers about how content should be taught. Influenced by their experiences studying abroad and the demands of the job market, lecturers see practical approaches as useful (see also 6.1). They all agree that practical exercises are critical to convey their knowledge. Thus, practical exercises have been included in the curriculum of most faculties. Additionally to the lecture, laboratory hours have been assigned to give students more space to practice. Homework for students in the form of practical exercises aims to train students to apply their skills. Even within the lecture, lecturers refer to practical examples and problems.

When I have worked personally on the systems [database systems], and then I instruct them to students, they really get the concept. If you have not worked on it, just telling the story, I cannot convince the students (...) For example in database, it is very theoretical and they complain about that they do not understand why they have to learn specific things. They just memorize definitions, what is database, what is relational database and so on. They do not know practically. If the lecturers teach them practically maybe all will know.

(Interview 54)

Another lecturer remembered, 'I think it was in 3rd semester. All students thought that we can't work on software development. But [our lecturer (name removed)] taught us, he forced us to do things, we had to do it. After the 5th semester we developed software.

(Interview 21)

As a student of computer science you need to have a computer. The first advice of our lecturers for our students is to have at least a computer, without computer you can't learn. You need to do lots of practical stuff, like Java. You can't learn just by how the teacher

is writing a program. That's ok, but they have to do lots of practical work in order to understand the concept.

(Interview 59)

These examples show that the primary objective is to teach students computer science knowledge and skills through practical work. This is in sharp contrast to old teaching practices that are still prevalent in some faculties. While the approach is certainly desired, the actual implementation is often difficult. Teaching students practically requires infrastructure and supervision.

At the beginning my fieldwork, we taught in a building that did not have a PC lab with capacity for all students. We had three classes with around 160 students and 15 PCs. We divided the students into smaller groups to ensure that we could supervise them during their practical exercise times. Logistical problems for students to stay longer in the faculty added to problems offering enough timeslots, as we were short-staffed with too heavy a work load. The solution was seen in a tutor system which has been proven successful at the computer science faculty at Herat University. A tutor concept was implemented a semester later only because it needed preparation. Approval from the administration was needed, but also students needed to be prepared for the fact that peers would teach them.

Overreliance on the benefits of practical exercises is also criticised by some lecturers. As one of the lecturer stated earlier, 'we are not teaching computer science. Here we are just learning and teaching skills' (Interview 46). The appreciation of practical skills leads to the teaching of the usage of computer programs for example. As one lecturer remarks, '[s]tudents who study computer science here, I am not complaining, they are teaching Microsoft Windows, Microsoft Word. But I think teaching applications is not good. In my opinion, we can teach operating systems, how an operating system looks and so on' (Interview 48). When asking further why the faculty is proceeding like this, the answer continued. 'They (...) all [just] think about the students. They think about all students, [and want to deliver for all of them]. Because the school education system has a lot of differences, students' knowledge is very different, so they decide to teach first all applications' (Interview 48). Two different issues are

raised. On the one hand, the lecturer pointed out that content is practical-delivered but that students learn to work with applications rather than understanding how a computer works. The objective to make students understand is not reached. On the other hand, the different levels of knowledge and skills lets students and lecturers opt for training students to use simple applications. Students are satisfied, because it ensures a good grade. Lecturers do not have to prepare, do not have to demonstrate that they themselves have practical knowledge and they can avoid disruptions as the students' style of learning is not changing. In particular the dynamics between lecturer and student are decisive, which will be further elaborated in 6.2.2.

Another example is the marking of homework. In our meetings we all agreed that homework is beneficial for students. We decided to give students practical exercises as homework. Importantly, we would also give students feedback. This has not really been proven successful. It demonstrated me, how difficult the situation for lecturers is. The classes are quite large, with around 70 to 100 students each, and we all had several courses to teach, so already logistically it was a huge effort. For students homework is not something new, but until now it was more a formality which no one took serious. Students and lecturers did not devote much attention to it and nobody cared. It was common practice that a few had to do the homework and the rest copied it, sometimes even photocopied. Sometimes, they were just putting different designs and backgrounds on their papers to make it individual. When homework was due, you could see in the morning groups of students clustering and copying homework. It was an interesting and informative scene, because it could give an insight how the student group was organised by seeing which groups have formed, who copied from who. When I looked at the homework, I could identify around four to six sources. These were mostly done by a few good students who did their homework, but there were also a few students who were forced by their fellow students to do the homework for them. Thereby, the students which are quite diverse clustered in the students from the city and the students from the provinces and grouped by their ethnic belonging. Only in extreme cases, these ethnic groupings were broken and then not voluntarily. Several times, I could

witness and lecturers confirmed, that students are coerced, sometimes by force to do the homework for their fellow classmates. This shows the crudeness of interactions within the classrooms.

With the goal to give feedback to the students, our aim was to show the students on the one hand, that copying of homework can be identified and further give them feedback so that they can see the work they are asked to do at home as them a beneficial component of their education. When I entered the classroom and saw the students copying their homework, they smiled whimsically, but were always surprised that I could identify the copied homework. In a conversation with a lecturer, I asked, why students always copy homework or cheat in the exams, to which he just answered: 'It is fun for us. That's our entertainment. We have good memories about that. We can tell stories about that. When I look back when I was a student, that's what we talk with our old classmates. It is not serious, it is fun' (Conversation 64). It is the lack of consequences that students exploit and what we as lectures discourage. After a few weeks, most of us stopped marking homework. For all of us, marking homework was important, but it seemed in this moment a very unsuccessful strategy. No motivation and even complaints by students only created problems for our reputation as lecturers (see 6.2.2). By experiencing how our strategy failed, we recognised how little attention and support from other actors in other worlds is given in the change of such a practice as homework.

The implementation of practical exercises is different in every faculty and depends on the above-mentioned conditions. How practical approaches are incorporated in computer science education still depends on the individual lecturers' social and scientific competence and their relationships with different worlds. Some changes are very quickly welcomed, and some are really slow.

6.2.1.2.1 Slides and Scripts

Besides incorporating more practical work and exercises within the lecture, the method of conveying information has changed. Technology like projectors and applications like PowerPoint presentations are now widely used. Lecturers,

when preparing and conducting the lecture, stress the practical approach as well as the use of technology, such as projectors, and materials, such as slides.

You can divide the lecture in introductory lectures. Mostly, demonstrative lecture, so the students can see and hear, by this they can get a lot of understanding. The basic lecture for example about processors, I am teaching the current problems, at the end of the class you mention the difficulties, the differences, the problems with programming microprocessors. After that I am giving the students slides. Preparing the slides in this way, that it gives the students a good insight. You are giving them a big picture of it.

(Interview 56)

The use of PowerPoint slides is common practice now. The needed technology such a projector is provided through donors. Lecturers have seen the use of PowerPoint in their study abroad but students use PowerPoint slides differently to the way anticipated by the lecturers. After each class, the students come and ask for the slides. They print them out and start memorising them. Before the exam, the most common question is, *Which slides should we learn?* Students want to know which of the slides will be tested in the exam and which they need to learn by heart.

They struggle with the new style of teaching and learning that the lecturers encourage. Students are used to their script which consists of the whole content of the lecture, which was read to them word by word in class. Now, the only written reference they have are the slides, which only contain bullet points. Lecturers provide literature references and encourage students to take notes but students are not used to searching for the literature and extracting the relevant parts from it.

‘Most students do not bring a pen or notebook to their class. They just sit there, and if they have Internet, they are on Facebook with their mobile or laptop’ (Informal Conversation 24). ‘Nobody takes notes; that’s our culture. In meeting all sit and drink tea, there is no culture of taking notes’ (Informal Conversation 25). Students rely on the slides and not what is explained or taught during the class.

The use of PowerPoint presentations breaks the students' routine. Previously established practices are disrupted. For students, the slides are a replacement for the script, which they start memorising for the exam. Lecturers aim to break the cycle of reproduction and encourage students to take notes, to see the slides as mnemonic aids and a summary of the lectures. Instead of a script, lecturers refer to reading lists with core literature.

However, the lecturers' anticipated scenarios do not play out yet. Students cling on to the slides and replace the script with these slides, memorising them word for word. Students are not used to studying further based on the given literature. In cases where exam questions diverge from the usual reproduction of information and ask for problem-solving skills and understanding, students struggle. The results are high failure rates in exams. A lecturer explained the following.

In Afghanistan, we give specific books and literature. Some of the lecturers, they give 5 to 10 sheets with questions and these questions will be in the exam. And if they [students] fail, they think they are not intelligent. They don't have much knowledge to pass (...) In Germany, students do not get a specific book, don't you? Because there are no specific books [which lecturers refer as only source of information], that's why they, [students in Germany], will learn lots of things. If they fail it is not a problem for them. Maybe the lecturer brought questions from the book he didn't learn, they do not care so much. (...) If you fail, you will learn more things from second chance. If you take the chance to study, you also have other benefits. It is not the worst thing, theoretically. But here they are feeling if I fail, it is like dying.

(Interview 33)

Students often have difficulties in coping with the change of teaching methods and high failure rates in exams bring many difficulties and challenges for lecturers, which are further examined in 6.2.2. Despite these difficulties, lecturers reject the idea of compiling a comprehensive script for their classes. I could not find any lecturer who compiled an official text book or a faculty which based their lectures on such. Neither have I seen a curriculum that refers to local literature. Such a textbook could support the standardisation of what a computer scientist in Afghanistan should know; it would contain the relevant body of knowledge. In the past, another lecturer reported, it was normal to compile such

textbooks. 'During the Russian regime, most lecturers went to Russia for their degrees; when they came back, they translated all their content into books in Dari. My father was Mathematics lecturer, there are good Dari Maths books until now. Nobody learned in Russian, everything was translated' (Informal Conversation 3). This encouraged me to suggest the compilation of textbooks. Our discussion was dominated by the beneficial usage of English literature and English as an instruction language.

6.2.1.2.2 English as Instruction Language

In our team, we talked about the translation and compilation of textbooks, but there was a very strong resistance to this idea. On the one hand, the lecturers aimed to translate the experiences which they had abroad, on the other hand, some mentioned quietly that they do not want to make the huge effort. Additionally, the MoHE indirectly supports such resistance by advocating English as an instruction language for the whole national higher education system. Thus, lecturers stress the importance of English in teaching and the advantageous use of English literature rather than local literature.

Computer science is a new part of knowledge in the world. Especially in Afghanistan. There is no real background in computer science here in terms of literature, teaching material or research. So most of computer science literature is written in English and most terminology is in English.

(Informal Conversation 40)

In the course of modernisation of the higher education system, the MoHE aims to introduce English as its instruction and scientific language. It is alarming what overwhelming support this intention receives. At all levels, this plan is accepted. Students, lecturers and the MoHE point out the advantages, and internationals point out the importance of it. I felt isolated when I tried to discuss the topic critically and advocated keeping local languages as instruction languages. We have discussed together within the faculty, I have discussed with lecturers, I have discussed with my students, we have asked for an essay from candidates for the scholarship selection test about the advantages and

disadvantages of English in computer science education. From all sites, from all groups, everyone only associates advantages with English as teaching language.

‘English is the scientific language’ (Informal Conversation 40), ‘The world of science speaks English’ (Informal conversation 2), or ‘If you know English, you have a better life’ (Interview 48) are examples of the typical tenor if asked for the benefits of English. ‘I think teaching in English is good, I didn’t find any problems with it’ (Interview 51). English as an instruction language is a consensus view. It is not very often that all agree on a topic so collectively. Lecturers explain, ‘you have to learn English in order to learn computer science. Because all the research is in English, one point, and the other point is that the programming languages are in English. If you are in Germany, if you are in Korea, Thailand or China, you have to do the programming in English, so you have to learn English that you get the concepts of programming’ (Informal Conversation 2).

Interestingly, nobody is really proficient in English. Students often do not speak English when entering university. Even lecturers have trouble with the language. Only after I repeatedly asked if they see any disadvantages of English as instruction language, their answers were often quite contradictory. ‘I think teaching in English is good. I didn’t find any problem. There are some problems. Some from far away provinces they do not speak English. They didn’t had English language in school, but right now it is not difficult, we have a lot of books, and material, we can study there by ourselves. Knowledge is everywhere in English’ (Interview 51). Many are aware that students and lecturers struggle with English but only a few really want to admit it. Instead, it is suggested that only students and lecturers from *far away* provinces are not proficient. It is always others who do not know the language, not oneself. Only one lecturer stated that students should be able to study in their local languages because it is their right as written in the constitution.

The goal to have English as an instruction language is welcomed, yet not everywhere implemented. The English proficiency of student and lecturers leads to lecturers teaching in the local language and providing literature in English, but even this has consequences.

Teachers also can't speak English very well. In that point it effects the quality of the teaching. On the other hand, students can't learn in English very well. In this it doubles the amount of degradation. That's why teachers should teach in Dari and they can use the contents and lecture notes in English.

(Interview 59)

I could experience the challenges that arise from teaching in English as I am only able to teach in English, an additional task for me it is not my native language. There were lots of student complaints because they did not understand me. At the same time, they did not want to work with a translator. There is much prestige attached to English language so students, even without understanding me well, agreed to be taught in English. In their CVs, they state that they have been taught in English, as if being taught in English represented their receipt of the *best knowledge*. English is so strongly linked to progress and modernity, it opens doors for employment, making it necessary to study abroad or to live in foreign countries. English is something that seems to have value in all worlds; it enables access to new worlds but also serves as a status symbol within all different worlds.

International agencies encourage and support this movement. Their support gives further value, so that everyone is eager to implement English as an instruction language. The world of foreigners seeks partners with good English skills and they are often perceived as more modern and open minded, the better they speak English. At the same time, implementing English is contrary to the goal of having an indigenous higher education system. The implementation of English as an instruction language is at the expense of providing quality education because students and lecturers cannot communicate smoothly in a second language they cannot speak proficiently.

For lecturers, the shift to English is convenient, as they can now refer to Standard English core literature in computer science. They can utilise materials from other universities more easily and there is no need to translate books. The consequence is that students cling even more to the slides. Students struggle to read the technical literature, they lack study and research skills as well as English proficiency. There is some existing Farsi computer science literature used in

Iranian universities, but students as well as lecturers refuse to study from these books. 'Iranians translate all words, we do not, so we can't understand the books' (Informal Conversation 8). In contrast to Afghanistan, Iranian literature does not use Anglicisms. For example, the computer has its own Farsi word (rayahneh: رایانه) but, in Afghanistan, the same word (computer: کامپیوتر) is used and is written in Arabic font. In Iran, all standard technical literature in computer science can be found translated to Farsi, alongside existing literature by Iranian scholars. Such a localisation of computer science knowledge has resulted in Iranian scholars creating their own terminology. Afghan students and lecturers do not make much use of this existing literature. There are political and cultural reasons why Iranian books are not much more frequently used. Even in Herat, which is close to Iran and where a high percentage of the lecturers even grew up and are used to the language, the usage of Iranian books is frowned upon. When asking the lecturers or students further, there is no real answer. The reconstruction process was heavily supported by the U.S. which banned the introduction of Iranian textbooks in schools. In addition, there is the historical language differences between Pashtu and Dari, which could be a valid reason in Pashtu speaking provinces but not Herat, where most speak Dari. Ideological differences and cultural discrimination, and the political complicated relationship between Afghanistan and Iran might have an influence. Yet, a few lecturer said, that there was no reasonable explanation, it was just better to learn it in English.

In Afghanistan, students as well lecturers favour English literature. When the lecturers teach, they often do not translate the technical terms. Lecturers teach in a mixture of their local language (Dari or Pashto) and English, and a mixture of written English and Persian words in Arabic and Latin font. Lecturers state that the translation of specific words is quite difficult, and the same applies to concepts. Sometimes I asked about translation of technical terms and concepts to provide my students with further information. In some cases, a literal translation does not make sense and the different ways in which language is organised and used often makes translations quite complicated. Students often did not understand my English examples which I used to explain, but instead of

translating or creating their own terminology, the strategy is to increase the use of English as an instruction language. A localisation of computer science could include making computer science knowledge accessible for students and lecturers in their own local language.

6.2.1.3 Summary

This section provided examples of changes that are taking place in computer science education. Lecturers want to contribute to the modernisation of the higher education system and provide the students with high quality education. They distance themselves from *old practices* and want to deliver *good teaching*. The lecturers' orientations and experiences as well as their interactions with other worlds (see 6.1.) influence how they construct what constitutes *good teaching*. Thereby, lecturers draw from their experiences in their foreign studies and transfer these ideas to the classrooms. Being more practical, using more modern technologies or teaching in English are examples of how lecturers translate their concept of being modern, being 'more scientific' into the classrooms. This is supported and incentivised by the foreign world. Donor agencies, development workers and study exchanges contribute to their vision.

The changes which are taking place are desired and accepted by all actors in the various worlds. Distancing from *old practices* is the key driver. Members of all the different worlds see the scientific centre in the West and the development and progress of these countries based on their scientific progress. This leads members of the higher education world to value foreign curricula or teaching methods highly. The experiences that lecturers make during their studies abroad are thus highly influential in how they construct what *good teaching* is.

There are several contradictions that I want to highlight. Lecturers state that they want to modernise teaching methods in order to reach high-quality education. At the same time, they impede reaching high-quality education. Lecturers focus on how information is conveyed to the students, rather than what information is conveyed. The examples also highlighted that students struggle with the use of slides or English as an instruction language. Instead of focusing on the compilation of text books, or more critically examining the introduction of

English as an instruction language, lecturers have established the use of projectors, slides and English as the way of modern teaching. Lecturers decontextualise the practices they have experienced abroad from the environment where they take place. In universities abroad, students are used to doing individual study. Furthermore, students have the proficiency in English to understand the literature they are reading, and in many non-English speaking countries, literature also exists in their local languages.

I do not want to argue that such practices are wrong for computer science education in Afghanistan, rather point out that the major hurdle that Afghanistan is facing right now is risky. Student struggle with the requirements when they could benefit with more contextualised teaching methods and appropriate material. They accept these challenges because being taught with these new teaching methods opens opportunities. For example, in 6.1.2.1 the TFBSO has been quoted that they were amazed that students and lecturers did their presentations in English, that they could show practical applications. Such validation of the ongoing developments is influential. The world of foreigners supports these developments by providing resources such as more projectors and a wealth of English courses.

We have talked about the advantages and disadvantages of local language versus English, or the compilation of text books, but the environment itself does not encourage a more reflective development. Additional to the emphasis by the world of foreigners, the higher education world contributes by not valuing scientific achievements. For example, the compilation of a textbook is time-consuming and needs research, it is more difficult than putting a PowerPoint presentation together. But donor organisations rather provide projectors and software than supporting the compilation of text books.

Despite the criticisms, changes do take place and computer science education develops. This section provided an insight into what *good teaching* is for the lecturers. Thereby, it is highlighted that the complexities and interests of the different worlds have an influence in the construction process.

6.2.2 The Good Lecturer

The lecturers wish to change to *better* teaching methods, but the understanding of *good teaching* often collides with what is expected of a *good lecturer*. As seen earlier (see 6.1.2), students and lecturers in their daily interaction discuss and negotiate their roles, tasks and commitments. The change in teaching methods as introduced in 6.2.1.2 has visible consequences. Any change also affects the existing social order within the higher education system, which is a very hierarchical order of students, lecturers and leadership. The following examines the challenges and the positionality of lecturers by focusing on the interaction between lecturers and students.

In 5.2, I emphasised that being a lecturer in the Afghan higher education system means more than instructing students. The role of lecturers is not limited to the physical space of the university, nor to the task of merely passing on computer science knowledge to students. Lecturers never leave their role as lecturers and are constantly judged on the moral and social norms which are prevalent in Afghan society. Their elevated position carries many expectations from the students, their parents and their communities, as well as their universities and the MoHE.

One lecturer stressed the expectations that are on them when they return from post-graduate studies. We talked about his best experiences and what he wishes to implement within his teaching.

Lecturer: The lecturers [in Germany] were really good, the relationship between lecturers and students, and the practical work was really interesting for me. Each subject was practical. One thing I have learned and what I was really impressed. Students ask the lecturers some questions, they [the lecturers] know that they are not embarrassing themselves when they proudly say "I don't know it". I really like the situation between students. And the students also never say anything. But in Afghanistan, it is different. Now I am a master, everyone's expectation is a lot. I am there and stand in front of a class and they ask me a question, if I don't know I will be so embarrassed. The students say "oh he is master and he doesn't know anything". But I don't mind. I will do as the lecturer doing in Germany. I don't

care and I will say, I learned this in Germany. I don't know and I will [re]search this for you in the future.
Me: What will the students do [when you do this]?
Lecturer: Students will not care about it. The students will talk behind the lecturer's [back]. He is a master and he doesn't know anything.
(Interview 61)

The lecturer points out that the attitudes and expectations of students and lecturers are different in Afghanistan and, in this case, Germany. By implementing what lecturers consider as *good* teaching methods, students question the nature of a *good* lecturer. In the above quote, the students talk behind the lecturers' back, which affects the lecturers' reputation and social position. Thus, such attacks affect how lecturers interact with students. Clarke (2005) cites Castellani (1999:254) by stressing, that 'it is not simply an interaction between people. It is the interaction of practice itself (...) It is the interaction of strategies, the interaction of power relations themselves as a diffuse field of organizing practices'. In the following, the interactions between students and lecturers are examined. The role of the lecturer who holds power and authority is under attack. How lecturers deal with these conflicts is what Strauss (1978) refers to 'negotiated ordering'. Such conflicts and negotiations present how practices come into being.

This section first presents the role of lecturers and the associated authority which is adjudicated to them. Second, it describes how lecturers maintain and deal with their relationships so as not to endanger their reputation and social position while working towards establishing computer science education.

6.2.2.1 The Role of Authority

In the classroom, lecturers hold the authority. This authority refers to scientific matters as well as control of the classrooms and its students. The lecturer-centred teaching style supports the role of an authoritative figure. Social and cultural norms prescribe authority to the lecturer, yet in conversations with the lecturers it becomes apparent that their authority is quite fragile.

The authority of a lecturer within the classroom and outside is linked to the reputation and social position of her or him inside the higher education

system as well as in society. This authority depends on the relationship with students, the faculty, the community, political structures and family structures. Some of the lecturers for example, are the son or daughter of a chancellor, some are cousins of the minister, or have other relations to members of parliament. While some of the lecturers do not have any influential connection. These connections have an influence on how to deal with the students.

One of the lecturers came back from his master degree. Beforehand, everyone was talking behind the back that he could only join, because his father is dean of the faculty and is a close friend of the chancellor. In the meantime, the chancellor was changed, new networks and groups were formed. Within the faculty, everybody waited to find out what would happen. While the students did not know the returning lecturer, the rumour made it to the classroom, that the lecturer is weak. The students immediately reacted, they did not listen, started to talk in the classroom loudly, took telephone calls and later went to the dean to ask for the lecturer to be replaced. Yet, the changes in leadership were new and nobody knew if they were stable, so that the dean did not react, he did not support the lecturer to gain control over his class, nor did he replace him. The lecturer went to every lecture in the classroom and was not able to control the class.

I talked with the lecturer to find out, what I could do to help. But he assured me that there were no problems in his class. Students would be struggling with his tough teaching contents, and that would be the reason why they wanted him changed, but he is in control. Nobody did anything, no support or protest. At the same time, I also did not want to interfere, offering my help was already showing that I was assuming that he is not in control, which is also shameful for him. The lecturer went to the classroom and got humiliated by the students, yet he pretended that everything was perfectly fine, not to lose face. Moreover, in faculty meetings, he was saying he could do more classes if needed. On the one hand, I could see how he struggled and wanted to help, yet I was also reserved, because he did not want to accept any help. The relation to his father played a huge role, as no one wanted to interfere and get mixed up into political cliquism. In the above case, the students actively disturbed the lecture. Sometimes, they talked behind his back, trying to attack the authority or reputation of the lecturer;

by talking behind the back about lecturers, by asking questions in order to intimidate lecturers, by disturbing classrooms to impede teaching, or even more drastic measures such as blackmail or threats against lecturers. While the students do not have any decision-making power, they can create problems, that lecturers

This seems quite contradictory to the prevailing norms of respect and the role of lecturers as a source of knowledge. One lecturer described how 'a good lecturer is a lecturer that does not make any problems' (Informal Conversation 24). Surprisingly, at the end the students did not have any problems with the lecturer from the scenario above. Other lecturers said, that he does not let anyone fail in the exam, his exams are easy and all get good grades. Students continued to disrespect the lecturer, but they were not actively discussing that with the dean or other lecturers. They silently put up with the lecturer and in return, nobody had to fear to fail. The students' prime objective is to graduate successfully from the university. Any changes that differ from the familiar are difficult to deal with. Students are used to rote-learning and have difficulties, not only in adapting but even to articulating their problems. Quotes like the following reflect this: 'students disagree with computer science' (Interview 33), or another lecturer who states 'students point out negative things, but they do not offer an own solution. They complain about the lecturers and say they want to have the lecturer changed. There is never constructive feedback like the lecturer is too fast, or we need more material. All students do not take it [the study] serious' (Informal Conversation 25).

But '[a]t the end you are responsible for the students' (Informal Conversation 25). Any change encounters resistance at the beginning. This leads to pressure on the lecturers because the students' resistance might influence one's reputation, thus one's social position within the faculty as well as in society. Well-intended change can lead to frustration and demotivation that makes young lecturers turn away from their ambitious vision and plans. At the same time, lecturers cannot turn freely to other lecturers and discuss the problems with students, as this would be signalling weakness to colleagues. Acknowledging problems with students signals to a lack of authority in the classroom so lecturers

hide their insecurities, or tell narratives about other lecturers' problems. In a discussion about problems with students, one lecturer pointed out that 'They [students] are not behaving, they do not study'. The answer from a colleague was 'first you have to tell them the rules. They need discipline. But don't forget. You are their mentor, not their enemy' (Informal Conversation 17). Such words are easily said but difficult to implement. This leads to the question of how to change strategies for a better relationship between lecturers and students so that they accept change and at the same time see you as a mentor. The role of a lecturer, as described in 5.2.1, incorporates ideals such as the image of the lecturer as mentor and support, but the lecturer as an authoritative figure receives more weight in Afghan society.

While lecturers describe their students as skilled and motivated, the above comments depict students as troublemakers and lazy. Students themselves underlie the social constraints of a society that highly appreciates academic achievement in the form of degree certificates, but does not value scientific achievements or knowledge. Thus, the students' priority is to get the best grades, to be first or second in class or to receive their degree certificate. They want to learn new things but disruptions such as the introduction of new teaching methods endanger their goals. Failing in an exam or dropping out of the course feels for students like dying (see quote 6.2.1.2.1), because it is seen as shameful for the student and her or his family and is condemned by society. To gain control in this threatening situation, the students' only choice is to act up, to blame others or discredit the teacher. Even within the classrooms there are huge classroom dynamics and politics going on which means that not all students are against the teaching methods, but classes often act as groups or group factions. These classroom interactions are examples of students and lecturers trying to win dominance of the space.

When I started to teach a class, I always observed the class dynamics in order to gain authority. In the front rows on one side are the women, who are always silent and do not engage much with the class, the men are mostly sitting next to their friends. In the first row, the boys who want to be the first in their class and want to demonstrate their keenness. In the back rows, the students who are waiting to challenge you. I usually start by giving them group work,

in which the composition of different factions come immediately to the surface. The groups divide firstly on gender, and then in terms of ethnic belonging. Important to identify are the students which are the most dominant and are guiding class behaviour. They are the ones who decide if a lecturer should be challenged for example. They are usually the ones from the city and their family is rich and/or influential. The strategies of the lecturers to deal with them are diverse. Some of the lecturers try to befriend them and gain their support. They are forgiving when the student does not attend and promise their help which means that they will protect him or her from failing in exams. These lecturers want to tap into their students' family network as well as the capacity of the student to mobilise his fellow class mates. Other lecturers are more careful, evaluating the links and see how and when they are beneficial. Yet, no one would confront these.

Within discussions, we thought about how we can establish a sensible relationship with the students, one of respect and one where scientific competence rather than social competence counts. We established regular meetings in which we as lecturers shared our experiences in the classrooms. Getting advice and suggestions from other lectures helped us feel less isolated and trapped in the situation. Additionally, it brought us lecturers closer together and strengthened our identification of being a lecturer.

6.2.2.2 *Maintaining Relations*

Maintaining relations is vital for lecturers in order to bring any change. Being a good lecturer is more than being scientifically competent, it is about maintaining the complex web of relationships. Again, a lecturer described 'if you are not creating problems [in your role as a lecturer] for anyone, then everyone likes you' (Informal Conversation 2). It is quite a challenge to negotiate between all relevant actors: the students, their families, administration, internationals and others and not getting into any conflicts. Especially during the exams, it becomes obvious how stressful the situation is for the lecturers. In conversations and interviews, I share my experiences of teaching with lecturers and sometimes I tell them:

Me: In my exam, half of the class failed. They were not happy. I was angry that students thought that by just being present, they can pass the university. I get prepared every day for my class. If they do not listen and can't answer the questions in the exam, that is

not my problem. After the semester they come, teacher please help me, help. Then, I ask them, "How can I help you?" – "Give me some points." I only answer, "I can help you beforehand, I can explain you, I can answer all your questions before the exam, at the exam it is your day!" They do not understand. There is so much corruption, they always passed [their courses] in the past. This semester I was dropping [means failing] one student and he came and I was sitting there with my colleague at the exam review. I asked, "How many points, do you need to pass?" He said "Seven points". I said, "Seven points are a lot! How can I find the seven points?" He said, "No problem, I called my uncle in the parliament, you should give me the points." "Excuse me?" "Yeah, it is already solved", he said. And I answered, "Nothing is solved, you do not get points because of your uncle". He got really upset.

(Interview 33)

Whenever I tell lecturers this story, lecturers start laughing because something that made me angry is their daily life. While I can just deny favours because I am not part of the local system, it is not as easy for the lecturers. It becomes apparent how thin the line is between their life within university and outside of it. Their actions within the classrooms sometimes have wide-ranging consequences. In some cases, students can gain power because they can tap into powerful social relationships.

Lecturer: Well, still we have that problem. In Afghanistan, everything is possible. (...) Parliament members have influence, they decide who will be Minister, who will be head of universities. They have lots of influence, if you do not follow, they will make some blackmail for teacher. Making problem for teacher. If they bring problem for teacher, teacher will not be there anymore. They have any power, they can also push you out. They can make some cases. Maybe you are a girl or women, I am a men, they make a problem, they say there is a [romantic] relation[ship] with this girl and this boy. Maybe it will be wrong, but they can say [this]. They are stating this problem, then the teacher will leave the university for the respect.

(Interview 33)

These are social constraints for the lecturers that allow corruption to spread. As lecturers, we aimed to introduce problem-solving techniques in the exam with the result that many students failed their exams, but failing in an exam

has not only consequences for the students, she or he represents her or his family. In order not to bring shame to the family, students do everything not to fail. Not only their family but even their community will start using their networks to persuade the lecturer to change the marks. Students or their families call the lecturers or their superiors constantly to ask for help, or they come directly to the university to talk with the lecturers.

In one of my classes, there was this girl, she barely could write her name in Latin alphabet. Students were talking about her, because apparently she even didn't know how to turn on her laptop. She spoke no word of English, but in the course 'Introduction to Scientific Writing' she had to. Of course she failed, as she returned a blank paper. Unfortunately, she also scored very low in all other courses.

Already before the exam, it had been told to us lecturers to let her pass, as she is the fiancé of a cousin of the Governor. I said that I will fail her, how could I give her points for an empty paper. In my other course she scored very badly, and apparently the situation was similar in the others. My colleague got telephone calls, letting him know that if we let her pass, his security would be ensured. A rather worrying phone call.

We discussed and spoke to the dean, telling him that we probably would have a problem as she scored badly. The dean contacted the chancellor. The relationship between Governor and chancellor was already difficult; the chancellor stemmed from a family in Kabul, with fewer roots and networks in the Northern provinces. The vice chancellor visited our faculty and asked to be helpful to the girl.

With two failed exams, she would still be in the class and could sit the second chance. We discussed who would probably fail her. I would fail her in English, as all students know that she doesn't speak a word, and if I let her pass in this exam, nobody would believe me. We discussed if we should do a relative ranking based on her score, or if we could be more generous with the marking of her answers.

I made her pass in the other exam and of course the next semester, all students asked me how she could pass the exam. The girl was sitting in class, and every time I looked at her, I could see her smiling shyly.

I was feeling bad for what I did. Especially, when I saw the other girls or boys who failed. One girl sat crying in the office for hours. She didn't leave, she said she will never leave. She can't go home, her parents will beat her, she will not survive. I have seen this so many times, boys and girls completely desperate for days standing in the office begging for a last chance. Many with no or few connections.

The strategies of lecturers are different, but many lecturers point out how to be diplomatic about it. In particular for new and young lecturers, it is difficult to deny students points or not pass them. These lecturers mostly have a lower social position and are dependent on maintaining good relationships in order to have a career. Due to the complex web of relationships, they do not want to risk endangering it. One lecturer gave the following advice for dealing with requests to change grades. 'What my point is, you don't have to pass the student. But you have to answer it very correctly, very political. If you say immediately, "I do not want to do it", it is not good. You answer "I will try to do it. I will try my best to do it. I will ask Eva, she is a foreigner, I will ask her to help him." Then he knows that you will help him. But maybe there are some further problems or Eva does not want to help him, so he cannot help him. But he tried to help him' (Interview 38). Thus, the lecturer made it clear that he is happy to help the students, but others further up the chain of command have made it impossible.

After the exam, the students, their relatives and other lecturers ask for support, sometimes even before the exam. Most of the time it is not a direct request, rather it is stated in the sentence, 'please help me'. Then as a lecturer one has to fulfil the role as a helpful member of society and signal one's helpfulness. While help does not always need to be granted, in conversation it becomes clear that there are constant negotiations going on. Corruption and graft are processes that have become so common that lecturers have learned how to deal with them. In a society which relies on social relationships one has to weigh which request to fulfil and which not. No one would say that they are corrupt, they would rather describe it as 'being flexible' with what is right and wrong and do things that they do not want to do. In fear that they may run into problems later on because they have not fulfilled the requests of others, they have to act 'flexibly', as one lecturer states.

'You have to be a little bit flexible in Afghanistan. It is good to have some relations to others. Because you will face some problem in Afghanistan. You have to make very good relations in society. You need it, your faculty needs it. If he/she is not good with one other person [this can have consequences]. Maybe, the university, or other members of the parliament, they cancel your scholarship [for

going to a master's or Ph.D. programme]. It is very easy in Afghanistan. Calling [to] the minister and cancel it.'

(Interview 38)

Exactly this is what happened to one of my former students. I talked with him during his study time and he was so excited about his studies and said that his biggest dream was to be a lecturer. No one in his family had ever had any higher education, and he wanted to make his family proud. A few semesters later, he applied to be a lecturer, he passed the exam and he taught some of the classes. Yet, the final approval of the documents had yet to be done. All newly hired lecturers' documents were sent to the MoHE to finalise the official process. But his were not, and the leadership apologised, saying that it would be sent with the next hired lecturer, he should just update his documents. Yet, the dean refused to update the documents. He was put in a deadlock position. I asked about the problem and in particular, who was blocking the procedure. If he would not have updated his documents in the next month, his chances to go to the next master programme would be gone, as only official lecturers were allowed to apply. After a longer discussion he told me, that he refused to pass a student in the exam and now they were punishing him. I asked another lecturer what we could do, and he said that it was quite a hopeless situation. The dean or the chancellor only promoted their own tribe, plus he did not help. He paid a high price for not following the orders of his superior, even for the right reasons.

Interactions with students are not one-to-one interactions, they are often many-to-many interactions. This interaction includes the web of social relationships of the family, relatives, communities or the workplace of the student as well as the lecturer. Thus, lecturers have to calculate strategically when to be *flexible*, to whom and how. 'You are their mentor, not their enemy!' (Informal Conversation 17), is an easy statement, but it includes how to handle students. Being 'flexible', being 'political' or 'diplomatic', or 'helping students' are synonyms for corruption. Thus, lecturers often hesitate when talking about how to handle students. If asked about strategies for handling students, lecturers tend to point out that they now include more practical exercises to motivate students,

but in the end, there is still a lot of corruption. Afghanistan is not high on the list of corruption without reason. It is cultural practice now.

Even between lecturers, relationships have to be maintained. I remember in an exam situation in the selection of a master's programme that lecturers themselves started to cheat. One lecturer tried to look at their colleagues' papers. I asked, why they are doing that, and if they allow their students to do that in their class? One of the lecturers who was willing to let his colleague copy the answers said.

The problem is, we people, Afghan people, we have to keep a lot of people happy. I don't think anyone should be allowed to cheat, but you have to keep everybody happy. For example, if I do not help my friends, they are not happy and this has different consequences.

(Interview 48)

6.2.2.3 Summary

Being a good lecturer requires careful negotiation of one's position within multiple social worlds and with members of social worlds from which one is excluded. Maintaining your social relations is a constant evaluation of relationships, it applies to the students, to colleagues, to the leadership of the university and to the MoHE as well as to the international actors. Thus, being a lecturer does not just mean being proficient in your knowledge domain, it includes acting diplomatically and politically within the environment. It seems that these traits are even more helpful than scientific competence because of the scientific marginalisation within the system.

It is difficult to implement new 'good' teaching methods and be a *good lecturer*. By complying with corruption or accepting it as cultural practice, lecturers reinforce these practices even further. Nevertheless, changes have taken place. During the first semester of my field work, we dropped many of the students and we had students crying and begging for changes in their grades but as lecturers we more or less collectively agreed not to be soft and give in to demands. The whole university talked about the computer science faculty that dropped so many students. At the time, lecturers argued with their superiors that

because of my presence they had to act correctly. Otherwise, maybe donors like the TU Berlin would become aware and stop their funding.

At the same time we were all quite conflicted. It was difficult to see the desperation of students when they failed the subject. Especially with the background knowledge that the whole system is so corrupt, I often asked myself whether it is worthwhile bringing changes. Lecturers have to fight to act correctly and then maybe have to deal with consequences later on. They are trying to encourage students to study, to make them understand the content, but students often did not study and thus failed. We decided not to change the marks and failed the students, and the effect was positive. In the second semester, students were more likely to accept the changes. They still complained, they still did not do their homework, but they also tried to find strategies to deal with the coming exams. We reminded them to ask for help before the exam. They started to ask more questions of the lecturers or formed groups to study together. Moreover, students and lecturers changed the system within the small scope of the faculty. This does not change the whole system, but it is a start. It begins when the students' image of a lecturer changes, and when lecturers can implement some of their vision.

Being a good lecturer opens possibilities, it strengthens one's position within the university environment which leads to more participation and decision-making power. So if students change their image of a good lecturer from one who does not make any problems in their lives to an image of a lecturer as someone from whom they can learn and get support, then lecturers' visions are more easily translated, because everybody is happy.

6.2.3 Needing a Good Degree

In the beginning of 6.2, I mentioned that lecturers' approach to reaching high-quality education is based on the approach of getting *good* degrees to get *good* knowledge which leads to *good* teaching and then to high-quality education. This section presents the rationale of lecturers of why a *good* degree is needed and what a *good* degree means for them. Lecturers identified that a *good* degree is a

suitable strategy to mediate between their visions of *good* teaching with being a *good* lecturer.

Lecturers are in conflict situations, where students threaten their reputation as a good lecturer because the changes that lecturers implement disrupt students' ways of studying (see 6.2.2). In order to strengthen their position, lecturers rely on the social and cultural capital that further qualifications give them; thus, they need a good degree.

Institutionalised cultural capital in the form of academic qualifications influences the interaction, because the accumulation of cultural capital leads to further reputation, which is then more difficult to attack later on. Such reputation does not necessarily contribute to the enhancement of scientific authority. Due to the low influence of scientific competence, it is rather seen as enhancing their social competence and social position.

For example, when I asked lecturers why they would like to get a postgraduate degree like a Ph.D., they point out that 'to be a lecturer in a university you should have a Ph.D.' (Informal Conversation 62). Lecturers observe developments abroad, where a Ph.D. became a standard requirement within the academic world (Becher, 1989:108; Clark, 1987). In this academic world, a Ph.D. provides scientific recognition and enhances scientific reputation, which enables the lecturer to enter and move up the scientific hierarchical structure (Becher, 1989:55). The focus of scientists lies on receiving recognition of their scientific work, in which the prestige and rank of a doctoral has influence. Yet the importance of scientific activities such as research has not been much mentioned by the lecturers when I asked why they need a Ph.D. Despite the lecturers' duties including research activities, the main focus is on teaching. No one explicitly speaks about research. The constant request for more or better knowledge, which for the lecturers means a *good* degree, often stems from the uncertainty of their knowledge in regard to teaching.

We need to update our knowledge. Because the IT field is not a static field, changes and everything is every day. We need to update our knowledge and by getting a master degree we can be a better person. I graduated in 2008, in these four years, I think I lost a lot of knowledge, because these subjects did not require

much knowledge. I just want to update myself. Be a better part for this country.

(Interview 47)

With the master degree, it will help me to be a good teacher. It will help to reach my goal and give me the opportunity make differences in Afghanistan.

(Interview 55)

The rationale of lecturers is that if they possess a further degree, they can introduce change. The applicability of the knowledge is secondary. More important is a formal certification to strengthen social position. The cultural capital that a degree awards supports a stronger position in society and provides more space and flexibility in the maintenance of their relations. At the same time, it has a reciprocal effect, as seen in the quote below.

Me: What do you expect by giving lecturers a Ph.D.?

Lecturer: It is the motivation that they give to students. The insights and the knowledge which they got from outside. You know the education outside is better than in Afghanistan. There things already there, they can get it. They get it from the professors, known professors, the best in the field. They get the behaviour and teaching style from outside. So when they come back they can use the styles and teaching materials. When they come they can apply it.

(Interview, 46)

Students give formal qualifications and the prestige attached much value. Foreign degrees, like foreign teaching methods, receive immense support. Lecturers with further academic qualifications, foreign degrees and higher academic rank are awarded more respect and at the same time do not face so many problems in their classrooms.

There are several lecturers enrolled in Ph.D. studies, but none of the lecturer has recently graduated their studies. Several lecturers are on a Fulbright scholarship in the U.S., several are in Germany, some study in Estonia, as well as in Italy. The limited opportunities of a scholarship award the lecturers even more prestige. Whenever I tell someone that I am now studying a Ph.D., they become happy and say, 'Oh, Dr. Eva. That's great'. I tell them that I am not a doctor yet, that I am still studying, the reply is 'But here in Afghanistan we call someone

doctar (Dari: دوکتر) immediately when they get accepted for their studies. [laughing] So when can I call you *doctar*?' When lecturers get accepted to do a Ph.D., their title changes from *ustad* to *doctar*. This title differs from the Afghan academic ranks, and *doctar* is only for the ones who have done a Ph.D., rather than achieving a higher ranking through other promotions. *Doctar* is a title that earns the highest level of respect.

Lecturers' strategies for getting further degrees for strengthening their position are quite successful. For example, students are motivated to study because lecturers have a higher title, which means that lecturers can introduce change. Not only students are influenced by formal academic degrees. The gained social and scientific competence through a master's or Ph.D. leads to a better reputation and social position within other worlds, such as their university and the higher education world. At the same time, because their authority is questioned on so many levels, getting a Ph.D. aims to counter any loss of authority.

Section 6.1.3.1 also reveals that lecturers do not necessarily show scientific curiosity in developing their Ph.D. proposals. This leads to the conclusion that wanting a postgraduate degree, in particular a Ph.D., is a political strategy. Lecturers would agree with one of their colleagues' statements, 'It is about the title. It is political, it is really good to have a Ph.D. If you want to be minister, president, vice president it is important.' Nevertheless, they would not state in interviews that they want a Ph.D. just because of the title. Instead, they point to their colleagues who just want the title. The role of a lecturer (see 5.2) is associated with service to the community which means that lecturers share and give back the knowledge they acquire. Wanting a Ph.D. to gain personal benefits, like a better position, would be contradictory to this image. Thus, lecturers would not officially state this.

When lecturers ask for a further degree like an MSc or a Ph.D., they refer to gaining *better* or *more* knowledge. This leads to questions of what *better* knowledge means for them. The introduction of English as an instruction language (see 6.2.1.2.2) shows that there is an overwhelming consensus among all actors. In particular, lecturers and students stress the link between science

and English. 'English is a scientific language' (Informal Conversation 40) or '[t]he world of science speaks English' (Informal Conversation 2) are reflections of this. Moreover, knowledge about the computer resides in the West and reinforces the idea that knowledge in the West has a superior role. This is echoed by development practice which is present through consultants and development workers that provide solutions to Afghanistan. For example, students preferred to be taught by me in English than by another lecturer in Dari. The teaching content would have probably been the same, but I got my degree from Germany and I am enrolled in a Ph.D. programme, so my knowledge was seen as more valuable than others'.

The lecturers trust in the scientific institutions of developed countries and see their outcome detached from social and political struggles. They grant knowledge from the West authority, an authority which is not questioned. While students and lecturers sometimes ask questions to test my knowledge, they usually just ask about what degrees I have, where I studied, what subjects I studied, how much time it takes to evaluate my level of knowledge. They believe that if they get into a postgraduate degree programme, they will get the knowledge they need so nobody can question them.

Because the degree programme determines what *good knowledge* is, it is important to find a good degree programme. The categorisation of a *good degree* or good education is very dependent on the current discourse and the lecturers who lead such discourse. As described earlier, the political dimension is always present in any discourse, even in the establishment of what a good degree is or is not. Often, it bears a detailed evaluation; it is based on the narratives of the lecturers and their social position as to which discursive construction prevails.

In 2010, when the first large group of master's lecturers returned from their studies at the TU Berlin, there was a huge discussion about the scientific validity of the degree. Lecturers themselves were not convinced about their scientific development. Other lecturers at a university in Kabul returned from their master's studies at a university in the UK at the same time. In order to stand their ground in the department, they were arguing about which degree was better. The deciding argument there was that at the university in the UK the

lecturers studied among other international students, while at TU Berlin there were some courses specific for the Afghan lecturers. They reasoned that these courses at TU Berlin were of lesser quality, and it was slowly established that the master's received from the UK must be qualitatively higher than the one from Germany.

Two years later, when a new group of master's graduates return from TU Berlin, other lecturers returned simultaneously from another university in the UK. Again, a discussion started over which degree is better. This time, it was argued that the degree from the UK was inferior to the one from Germany, as in the UK a master's is only one year and so not comparable to a two years master's programme in Germany.

The construction of what a *good* degree is, and how much it should be valued within the Afghan higher education system depends on such discourses. Asking why lecturers pay so much attention to where one graduated leads back to discussions about competition among lecturers to strengthen their positions. Becher (1989) stresses that the quest for recognition is a fundamental aspect of academic community life, and that affiliations with major universities award prestige and power. The difference, I believe, is that because disciplines and community life is professionalised in Western countries, lecturers and academics compete to move up a scientific hierarchy. Lecturers in Afghanistan try to determine which degree is better without a scientific evaluation. The scientific competence is secondary, the social competence is more decisive. Discrediting others' qualifications threatens their reputation and social position. There is still no real collaboration or appreciation of their colleagues or other lecturers. The competition that is going on fragments lecturers rather than encouraging them to share experience and collaborate within their social world.

Lecturer: The problem here is that the universities do not work together. Everyone wants to be a leader himself. This makes it difficult. That's why our IT is in this state. We could be more successful by using all the master's and bachelor's coming from India, Germany, anywhere else, but we need to work in a team (...)

Me: How do you overcome such problems?

Lecturer: I cannot tell my lecturers to work in teamwork, but I can tell my students. (Interview 46).

This demonstrates again how strong social and political conditions underlie any development within the country. Nevertheless, the last quote demonstrates that lecturers have hope. It also shows how lecturers conform to the role of the lecturer serving society. Their vocation is to educate the new generation and contribute to the social reconstruction of the country. At the same time, the lecturers are the new generation on which hope is built. The ongoing discussions and struggles show that change is happening only step by step. Moreover, the lecturers' strategy to gain a Ph.D. in order to gain authority is reproducing the old existing structures rather than changing them.

6.2.4 Summary

This section presented an insight into how the lecturers bring computer science into the classrooms. The computer science lecturers signal very strongly that they want to distinguish themselves from old practices which are still conducted in some of the other faculties. The computer has advanced to a symbol for modernity and so the lecturers demonstrate their connection to the information and networked world by incorporating new methodologies and new technologies in their teaching. *Good teaching* is practical, applied and problem-oriented. Lecturers aim to use slides, to give core literature rather than textbooks to encourage self-studying. They teach in English and try to converge to international standards but they encounter resistance from students. Any change endangers the students' objective to pass the semester and receive a degree certificate. This resistance, which lecturers are confronted with, is carried out sometimes even outside the university environment. Social hierarchies are utilised to maintain social order. *A good lecturer* is supposed to educate and share her or his knowledge with the students as she or he is in service for the students, community or country. Thus, if students are in danger of failing or dropping out, the student and the relationships they maintain act to 'correct' the situation. For students, a *good* lecturer is one who does not endanger their university degree.

Lecturers see a *good* lecturer as one who educates the students and gives them more opportunities to learn by incorporating new teaching methods. New

teaching methods are mostly welcomed by the students as long as there is no change in the assessment and their passing is safe. Teaching in English, for example, is appreciated and accepted by all actors in the field. Nevertheless, teaching in English or reading in English is still difficult for most but teaching in English or using new educational technology is uncritically beneficial. Moreover, it adds to the identity of the discipline as well as the students and lecturers as being modern and advanced.

As I stated at the beginning, in order to introduce changes and sustainably change the education landscape, lecturers ask for a postgraduate degree. To overcome the challenges of mediating between what *good teaching* is and what a *good lecturer* is, a good degree can settle conflicts by providing authority which others have to accept. Holding a postgraduate degree gives them authority in the classrooms but also within the administration, the private sector and with international partners. There seems to be no disadvantage of going for an MSc or PhD but the danger is that by educating lecturers further just for the sake of a title, a system becomes established that still does not appreciate scientific development and consists of lecturers who are not interested in it either, using it instead as a tool for authority.

6.3 Conclusion

This chapter engages with the sub-research question, *how do computer science lecturers in Afghanistan construct/understand their discipline?* Thereby, the focus is on the role of lecturers in the construction of computer science education in the higher education system. The first section has highlighted how lecturers build an understanding of what a computer scientist does and needs to know through interactions within the higher education world as well as the world of foreigners and the private sector. The second section examines how lecturers transfer their understanding of a computer scientist into the classrooms. Both sections highlight how lecturers have to maintain multiple positions within multiple social worlds and carefully negotiate between them.

Computer science education becomes established through collective action and requires a careful negotiation of interests. In 6.1, it has been stressed

how lecturers build the image of a computer scientist. This image is directly and indirectly shaped by the world of foreigners through lecturers' studies abroad, the international models of computer science education and the job opportunities from foreign companies or international organisations.

At the same time, lecturers feel a stagnation in their science system. Throughout the chapter, I have highlighted that in order to maintain the social order, a constant marginalisation of scientific authority takes place. The result is that institutionalisation processes take place quite quickly, while the academic professionalisation of the lecturers comes to a near standstill. This leads in part to a reproduction of the social structure, as lecturers focus on their social competence over their scientific one.

The overly influential social order demonstrates how close science and society are entangled together in Afghanistan. The establishment of computer science is a very social process and has been in countries like the US or UK. Yet in these countries, a science system has been in place. In Afghanistan, such a science system was destroyed and the quick establishment of computer science now relies heavily on international ideals and interests. In particular, practices such as using English as an instruction language or the incorporation of modern technology into teaching reflect the influence of such international ideals. At the same time, it shows how difficult it is to bring changes into already established practices.

In order to implement their ideals, lecturers are confronted with social and political struggles and need to negotiate not only scientific and technical knowledge and practices but also socio-cultural and political-economic ones.

7 Discussion and Conclusion

It can be seen from the foregoing that computer science as an academic discipline established itself quite quickly within the Afghan higher education system. Computer science proceeded to become a very popular study degree with more students every year. Over the last few years, the number of computer science faculties has grown and it is now possible to study computer science at nine out of 33 governmental universities within the country. Within the faculties, the number of lecturers is constantly growing. Additionally, computer science lecturers are highly qualified, returning from their master's and Ph.D. degree programmes from abroad.

Over the last ten years, I have had the chance to be part of the establishment of computer science as an academic discipline. In the beginning, I was teaching computer science at Herat University. However, over time our project extended to the establishment of IT infrastructures within the higher education system, as well as supporting computer science education. My work incorporated project management tasks and coordination between different local universities, TU Berlin, the MoHE and our donors. The task was to ensure smooth implementation of our projects, anticipate challenges, solve problems and act strategically. It was at this point that I realised that the establishment of computer science was a highly social and political undertaking, deeply embedded in Afghan society.

This study is about the construction of computer science as an academic discipline in Afghanistan's higher education system carried out in the tradition of science and technology studies. It utilises situational analysis to highlight the dynamics and complexities of the social processes in which computer science as an academic discipline becomes established. Situational analysis allows the researcher to focus on individual and collective action and is, therefore, suitable for following the university lecturers as the main actors to get an in-depth insight. Additionally, I aimed to gain an understanding of the situation in collaboration with the lecturers and support the realisation and implementation of computer

science directly. I chose to conduct qualitative fieldwork over two academic semesters at one computer science faculty as well as visits to other faculties. Situational analysis has been combined with action research (see Chapter 3 but also 7.3 and 7.5) to benefit from an analytical as well as an applied approach. Action Research allowed the combination of the lecturers' and my understanding, further we discussed together how to support computer science education as well as the lecturers' own professionalisation. We tried out different strategies and through failure and success of these strategies, we could refine our understanding of the situation.

This study provides a '*thick description*' (Geertz, cited in Clarke, 2005:xxiii) of developments in computer science in the higher education system and the people who take part. The purpose of the study is to understand the social processes and explicate the conditions upon which they are based. The research sub-questions seek insight into the higher education system. In particular, this research shows (1) how lecturers mediate their position within the highly complex field of various actors, (2) how socio-cultural elements, which are embedded in Afghan society, underlie any action the lecturers take and, based on this, (3) how lecturers define what a computer scientist is and construct the discipline through their established practices.

The insight into the higher education system and the lecturers as main actors relate this research to the main research question. However, before addressing in the discussion what the findings mean for the reform and modernisation processes of the higher education system and the role of the lecturers within it, the following summarises the main findings. The chapter then leads into a discussion of the research question. Furthermore, I reflect on the conceptual and methodological framework that I used and highlight the limitations. As a final point, I present future questions that arise or need to be answered.

7.1 Synopsis of the Story and Main Findings

This thesis has traced how computer science becomes established in the higher education system. These developments have happened during a time of

reconstruction and a strong international community presence. Afghanistan was in an isolated state but, since the intervention in 2002, the country's agenda has been directed towards state-building and democratisation (Suhrke, 2007). During the constant conflicts within the country, the state and its formal institutions were undermined. Social cohesion was destroyed among members of society. Power structures based on informal and private networks gained influence within the country and are still strongly prevalent. At the same time, international agendas invested in the strengthening of formal institutions and the state.

The reconstruction of the higher education system is part of the reconstruction process whereby any processes are informed by international expertise; the whole state-building process is seen as a technical exercise (Chandler, 2006; Goodhand and Sedra, 2013; Suhrke, 2007). The major social worlds that participated in the formation of computer science have been the world of foreigners with its global organisations, country agencies, foreign universities and the higher education world, in junction with the MoHE, its departments and the universities as well as ministries and the private sector (see Figure 4-6).

Computer science received attention within this reconstruction process and gained a prominent role in the scientific system as well as in society (see 5.1.1). The presence of the international community supported the emphasis on computer science. The MoHE and the MCIT identified computer science as a key discipline that can contribute to socio-economic development. This strengthens the claim of Galliard *et al.* (1997) that in developing countries, scientific communities and disciplines are influenced and governed by socio-economic goals.

Higher education and the universities themselves are in the middle of modernisation and reform processes. Globalisation and internationalisation of the education system influences what knowledge and skills need to be taught. For example, the global emphasis on the knowledge economy transformed universities into knowledge producers and produced a shift towards more contextualised and localised research that is problem-focused and

interdisciplinary, also known as 'Mode 2' knowledge (Gibbons *et al.*, 1994). Such transformation has not only policy and strategy implications for the MoHE but has also led to struggles in curriculum development and teaching methods concerning students as well as lecturers, as seen later.

The MoHE's goal to create a knowledge economy puts an emphasis on the social relevance and transformational character of IT (MoHE, 2009). This and the transformation towards a merit-based system that emphasises faculty development, curriculum development and faculty research has benefited computer science (see 5.1.1 and 5.1.2). Because of the novelty of computer science, many things could be freshly implemented rather than just being adapted or changed. In particular, the very young faculty body is the result of computer science being newly established without having to deal with inherited liabilities.

While computer science gained a significant role through international development assistance, the institutionalisation of the discipline has taken place in the local system (see 5.1.3). Moreover, changing practices and a change of scientific culture is happening within the higher education world in the absence of the outer international world. International development practice is only able to influence through local actors. This puts the spotlight on the lecturers as a highly favoured actor group of international actors in the reconstruction process.

The lecturers, who are predominately young, newly qualified from foreign universities and English-speaking are ideal translators and mediators between the international and the local worlds. Nevertheless, within the local system they inhabit a lower social position in the local system which is very hierarchically structured and is based on age and social capital. International actors look to the lecturers in order to implement their interests while lecturers seek international partners in their mission to bring changes in the local system. International partners contribute to economic and social capital enabling lecturers to gain authority and respect, thus strengthening their social position within their local system. Additionally, international actors reward lecturers with trips, training and scholarships when lecturers defend their interests on their behalf. However, this attention from international partners often puts lecturers in the middle of

conflicts, as others feel envious (see 5.1.2). The increase of economic and social capital that internationals award threatens older elites and disrupts social order (see 5.2.1). The result is that the influence of younger lecturers is limited from the beginning. Conflicts are shifted to political and socio-cultural fields in which social position is a determining factor in winning such struggles. The example of lecturers' acknowledgement of master's degrees has been an example to demonstrate how documents and administrative procedures are used as political pawns (see 5.1.3). Constant struggles between dominant and dominated actors are present.

Computer science and its application of IT in the higher education system gives the computer science lecturers a superior role. However, it is a role that is highly contested. '[T]he generation with laptops and the shoe polisher of foreigner' (Informal Conversation 16, see 5.2.2) is a typical accusation aimed at lecturers. Yet, because computer science and IT knowledge are so new and undeveloped, the lecturers can gain scientific competence over it. Building on Bourdieu's (1988) concept of scientific and social competence, it is clear that lecturers could gain scientific competence over computer science knowledge, but in order to avoid changes in social order, scientific competence is constantly marginalised. Any struggles are shifted away from scientific issues.

Furthermore, the image of a lecturer is not only associated with teaching. It is connected to a socio-cultural role model for a righteous life stemming from an Islamic understanding. Learning and teaching are linked not only for the sake of knowledge; it is always connected to a purpose. The lecturers' sphere of action extends into their private lives, and their beliefs, character and moral integrity are equally or even more important than their academic expertise (see 5.2.1). The lecturers have never abandoned this socio-cultural identity of a lecturer and this limits their behaviour. The permeable boundary between private and professional life is crucial to understanding why the lecturers act in specific ways.

Different worlds influence the content of the curriculum. The curriculum is significant in the institutionalisation of a discipline. It incorporates what knowledge and skills the discipline comprises along with the role it plays within the higher education system as well as how it serves society. Lecturers debate

whether computer science should serve the economic needs of the country or if it should converge to international standards. These are two different goals because the knowledge and skills that are prescribed in international curricula are different to what the job market demands. On the one hand, the lecturers value their education and their experiences and want to incorporate this in computer science education. This stems from experiences abroad because no postgraduate education is available locally. However, the private sector and the job opportunities also influence directly or indirectly what knowledge and skills are in demand. The students and lecturers are aware of what is happening outside their classrooms, in foreign universities or on the job market.

It is important for the lecturers to distinguish themselves from older practices that are still prevalent in Afghan universities. Lecturers want to implement new and modern teaching methods. They construct what good teaching is from what they have experienced. Good teaching is practical and applied, but moreover it aims to be aligned with international practices. The introduction of slides and scripts, along with the aim to institutionalise English as an instruction language are indicators of how much international practices serve as role models for the Afghan higher education system.

While the transfer of technology and material might be easy, the transfer of methodologies and practices is not. The transfer and implementation of new practices push on many different boundaries. The hierarchical structure in place limits younger lecturers' influence. In order to maintain social order, struggles shift away from scientific debates, as mentioned earlier. Often, lecturers are excluded from decision-making processes. At the same time, students resist any change. The conditions of the society which honours lecturers and knowledge have been undermined by structures based on webs of relationships where social capital is decisive. Corruption and graft have become established as normal practices and make changes difficult (see 6.2).

Gaining further certificates and degrees seems the strategy of lecturers. Getting a master's or Ph.D. is the objective, yet it seems that the scientific endeavour of knowledge production is secondary. However, if students, other lecturers and administrators change their practices because of a formal title, then

this might be a good strategy to continue. Lecturers can see the dangers when a system is reproduced, where scientific discoveries stay marginalised and change does not take place.

The formal institutional processes have taken place quite quickly, but this research also shows how the lecturers have to mediate between technical and socio-cultural practices. Moreover, they act as translators of different social worlds. This influences how they perceive themselves and shapes their own identity as well as their disciplines' identity.

7.1.1 Main Findings

The story has been compiled from the sub-research questions, which are directed towards understanding and examining the developments and processes in computer science in Afghanistan. Thereby, the objective was to explicate the interrelations between the different social worlds as well as to build an understanding of how computer science education is constructed. Computer science developments are social processes; even more, computer science in Afghanistan shows how close society and science are entangled together.

The data chapters and the summary above give a detailed insight into the situation of computer science developments. The situation is complex, the influence of socio-cultural elements as well as the presence of the international community and other conditions are prevalent. For further discussion, I list the main findings briefly and then set them in relation to the literature that has already been introduced in the literature review.

- (1) The lecturers are translators and mediators between the different social worlds and are often positioned in conflicting positions through which they have to negotiate their position and interests.
- (2) Any action or interaction of the lecturers within the higher education world or society is informed by socio-cultural elements. In particular, the discursive construction of being a lecturer assigns values and norms that both guide and limit lecturers' actions at the same time.

- (3) The construction of computer science is heavily influenced by international actors and their practices. At the same time, lecturers neglect the localisation of such practices.
- (4) Formal institutionalisation, such as the opening of further computer science faculties, the introduction of degree programmes, hiring of lecturers and provision of facilities such as buildings and PC-laboratories takes place quickly. Research and teaching activities lag behind because they are not prioritised by the lecturers or actors in other worlds.
- (5) Within the higher education world, scientific competence is marginalised and academic professionalisation remains unappreciated, which stems from a fear of change in the established social order.

The literature review brings two different topics together. On the one hand, I draw on the literature of social studies of computer science and discipline formation. On the other hand, that of science in development with its role and implications for computer science in developing countries.

Within the literature of discipline formation, Bourdieu's (1988) concept of the scientific and social field was helpful in addressing the different struggles that take place. Bourdieu (1988) stated that disciplines are subject to a hierarchy. Disciplines order each other around the opposing poles of social and scientific competence. In the world of higher education in Afghanistan, it has been experienced how scientific competence is marginalised and social competence is still decisive. Disciplines are positioned according to how influential and relevant they are for society. Thus, the interests of most actors and actor groups lie in gaining authority and social competence. Moreover, the overreliance on social competence has its repercussions. Getting ensnared in socio-political struggles, lecturers neglect their academic professionalisation. Although the situation is now not as extreme as it has been in the higher education system in Afghanistan, Gaillard (1991) indicates that scientists in developing countries are not able to pursue their research activities because of social constraints such as low salaries, and they suffer from less appreciation as well as low applicability of their scientific competence.

The scientific world in Afghanistan remains underdeveloped. Bourdieu (1975:19) defines the scientific world as one where agents possess 'socially recognised capacity to speak and act legitimately'. Social and cultural capital cannot be distinguished from technical and scientific capacity, but scientific communities have developed over time and established mechanisms to organise themselves. Publication and peer-review are example mechanisms for gaining reputation. Becher (1989:60) states 'peer-review, it may be said, serves to maintain overall standards as well as to recognize individual excellence'. It is a social mechanism which validates the scientists' authority to speak in scientific matters. In the higher education world in Afghanistan, such mechanisms are non-existent or only rudimentally applied.

The overly influential social order needs to be highlighted. Who is allowed to speak authoritatively is dominated through social hierarchies and webs of relationships. Patronage, clientelism and reciprocal dependencies define what is said, what is valued, who can say it and who is listening. Corruption, graft and blackmail are still dominant mechanisms to provide legitimacy to actors within society, but these mechanisms also dominate the higher education world; social competence rather than scientific competence characterises the higher education system.

Gaillard *et al.* (1997) stress that scientific activities in developing countries are peripheral to scientific activities in developed countries. The scientific world is shaped more by battles over resources than struggles over scientific authority. Further, Gaillard *et al.* (1997) state that infrastructural and material shortages limit scientific curiosity and the research spirit and thus lead to marginalisation of scientific achievements. Considering the situation in which the lecturers are positioned, Gaillard's *et al.* (1997) observation is valid.

This explains why formal institutionalisation like the introduction of degree programmes or the provision of facilities progress quickly, but research and teaching lag behind. The establishment of a PC-Pool or libraries, the provision of Internet or the creation of a curriculum are visible artefacts which can be seen as completed achievements. The MoHE, the international community and the lecturers can all refer to the accomplishment of such tasks. In this way,

they can demonstrate their social influence and authority but without examining their application; they do not have meaning in the scientific world.

The development of computer science in Afghanistan is not only a scientific endeavour, it is embedded into institution-building and reconstruction. In particular, development practices have the entrenched belief that science and technology are solutions in the creation of modern societies (Smith, 2009). Thereby, developing countries aim to modernise and adapt to Western science. Through international development cooperation in the form of financial support or technical assistance, the lecturers in Afghanistan aim to implement their vision and orientation for computer science education. Meanwhile, international actors compete for a similar gain of influence and authority within the higher education world. To gain access and control, they cooperate with the lecturers. International actors provide resources, but in return they expect their interests to be defended. This does not always happen explicitly but scholarships, training or provision of particular technologies have an influence on the lecturers. For example, Clarke (2005) stresses that the reality is consequential, which means that through the resources given, lecturers become familiar with a country, an education system or a technology, and these experiences and perspectives form their vision and orientation upon which their further actions are based. This leads to the point that the establishment of computer science is heavily influenced by international actors and their practices.

That the transfer of science is complex has been pointed out in the literature review (see 2.2). For example, the export of MIT (Leslie and Kargon, 2006) was a project to export academic institutions, but it was underestimated how far the embedded American experiences and expectations would fail to coincide with the political and economic realities. The awareness that Western science is a Western construct and that history and social factors shape scientific communities is still often neglected by those involved (Shrum, 2005).

In the establishment of computer science education in Afghanistan, it has been shown that the lecturers try to mediate between the economic needs of the countries and the international standards of computer science education. They would like to implement their vision which is heavily influenced by international

practices (see above) but international development practice has the intrinsic belief that Western models are the right ones. While the world of foreigners does not have direct access to decision-making positions to implement their models, lecturers are mostly limited by the socio-cultural norms of their society. They get roped into political struggles, which are often about gaining institutional leadership. Political conflicts arise about who sets standards in ostensibly technical processes such as curriculum development, but the more computer science departments and degree programmes that open, the more similar the programme content becomes. It can be observed that over the last years, the degree programmes and curricula at Afghan universities have converged.

Such convergence happens when lecturers meet and discuss their experiences and vision. Conferences are places where lecturers interact and discuss educational issues like curriculum development as well as more infrastructural issues such as the plans for a National Research and Education Network. Garud (2008:1084) described conferences as places of 'non-linear interactions at the boundaries'. Throughout the thesis, socio-cultural mechanisms have been mentioned which dominate official discussions. In conferences and other places where lecturers officially meet, the lecturers talk in various group constellations, thus it is visible how various boundaries are contested. Nevertheless, these interactions, common study experiences or training contribute to implicit converging or diverging changes in lecturers' orientation and vision.

The way the lecturers interact in conferences, in their faculties, even in their private lives, is heavily informed by discursive constructions about being a lecturer in Afghan society. The lecturer is a role model for righteous life, in service for their community; the society they live in extends the sphere of action. Halstead (2004:525) stresses personal lives, beliefs, character and moral integrity are equally as important as academic expertise. The particular role of the lecturer, which is derived from social-cultural norms, contributes to reproduction of a robust social structure. Within the classrooms, they struggle to implement changes because these often lead to interruptions and lecturers are attacked for not conforming to the good and helpful lecturer role. Thus, lecturers

carefully negotiate their position within multiple local worlds, even ones of which they are not a part. At the same time, lecturers are involved in the development projects of foreigners and also have to maintain their expectations.

The lecturers are in the middle of conflicting worlds, having to maintain conflicting positions and negotiating not only scientific and technical knowledge and practices but also socio-cultural and political-economic ones.

7.2 Research Question Revisited

The creation of computer science is a very social process. Many different actor groups and actors are involved in the construction of computer science. The research followed the lecturers to understand their perspectives and their roles in the construction of the discipline. They are presented as actors who mediate between different worlds. Further, they not only teach in the classrooms, they are active members of the higher education system. To close this thesis, the following links the findings of this research back to the main research question.

What are the dynamics of change in computer science education in Afghanistan and the role of the lecturers within these processes?

The research question explicitly recognises that computer science as an academic discipline is developing quickly. The current developments are embedded in larger reform and modernisation processes of the country. This section reflects on these current developments and the dynamics of change by examining the role of the lecturers.

The reconstruction of the higher education system and, in particular, the establishment of computer science, is part of the larger international intervention to strengthen governmental institutions. The World Development Report in 2011 stresses that the cycles of fragility can be broken through the establishment of effective institutions (World Bank, 2011). Universities are institutions that are able to build 'the rules, organizations and social norms that facilitate coordination of human action' (World Bank, 2003:38). Education systems are systems that reconstruct the *status quo* or class structures that characterises society. Thus, the modernisation and reform processes of the higher education system are

interesting to reflect upon. Much strategy and policy discourse and literature about education systems in Afghanistan highlight the young demography of the country which promises an opportunity to modernise Afghanistan quite quickly (Buckland, 2005; Matsumoto, 2008; Spink, 2005; UNESCO, 2011; UNICEF, 2006). Such discourses stress the 'window of opportunity' (Collier, 2009:122) or the 'opportunity for deep innovation' (Davies, 2004:165) which has opened up for countries like Afghanistan because of the enormous attention of the international community and the financial support which is offered when rethinking objectives and taking action to bring significant changes (Spink, 2005).

All current developments are embedded in the reconstruction and state-building project. Suhrke (2007) describes it as a 'social engineering' project in which reconstruction is seen as modernisation focused on a strong state, democratisation and socio-economic well-being. Military intervention and the accompanying state-building project are inevitably present in Afghan reality. In the streets, foreign military presence is high and national army and police are visible, as are development workers. Moreover, the international community is present in all sectors and regions of the country through development projects. In recent years, more literature has critically examined the developments in the last decade of intervention. The foreign role in Afghanistan is significant, which is also clear in this research project about computer science. However, local configurations have been studied more in detail because much of the donor-sponsored development failed or did not have the desirable effects.

The rationale (see also 1.2) of this research stems from the increasing role of ICTs in the reconstruction process. The uptake of ICTs has enabled computer science as an academic discipline to become an important, desirable and popular degree programme. Throughout the thesis, it has been stressed that many Afghans see computer science as beneficial; it is a discipline that is very much linked to a modern lifestyle. It does not only carry the symbolic meaning of modernity, it offers economic well-being. The emphasis on socio-economic development in Afghanistan's development plan contributes to the fact that the MoHE and the MCIT have given computer science much attention.

What are the reform and modernisation processes that are taking place? The strategy plan of the MoHE states that the mission is to 'facilitate equitable access to higher education to all who are academically qualified, establish innovative institutions that provide high quality teaching, research and service; produce graduates, who are competitive in a global economy; contribute to economic growth, social development, nation building and the stability of the country' (MoHE, 2009:4). In order to reach high quality education, the MoHE proposed the following goals: 'curriculum development, merit-based recruitment and promotion system, policies designed to increase research and publication, improvement of facilities (e.g. libraries, ICT, Internet access), development of graduate programs, foreign language instruction (especially English), quality improvement and accreditation' (MoHE, 2009:4). Several of these goals have been subjects in the data chapters. The different social worlds that take part or are absent in the various issues have been displayed. The curriculum and English as an instruction language are examples where a variety of social worlds have influence while the promotion system is quite protected from worlds like the world of foreigners.

The vision and mission of the MoHE sounds very ambitious. The challenges within the processes have been described within the thesis. The struggle between international standards and contributing to socio-economic goals is immense. Two different areas of interest, that of lecturers and that of international institutions, are significant for the establishment of computer science. International bodies of knowledge and their practices heavily inform both sets of interests. Nevertheless, the lecturers create their own version of computer science in the classrooms but are confronted with different challenges in the localisation of this knowledge and practices. Thereby, lecturers pick up a role as translators between different social worlds and have to negotiate between socio-cultural and scientific practices and knowledge. This influences how they perceive themselves as well as the identity they construct for themselves and the discipline.

The data chapters have shown that the lecturers' vision of computer science education is strongly aligned to Western computer science research and

education. The high financial dependency of post-conflict countries leads to questions about who is responsible for deciding on strategies involved in the reconstruction process. While the state is often weak and cannot fulfil its educative and formative role effectively (Sharma and Gupta, 2006), several agendas try to win recognition without a political space to mediate them. In general, lecturers agree with education policies that are imported through international actors and practices that are informed by an international body of knowledge. This is much aligned with Davies's (2004:167) assertion, that education officials desire 'a fresh organizational reality which was economically sound and rationally structured'. With new educational reform, education leaders aim to create distance from the previous regime and political systems (Buckland, 2005; Davies, 2004). The lecturers clearly expressed a wish to change the old practices and bring new practices. Thereby, they seek solutions that have been proven successful or promising in other countries. The introduction of slides and the use of PowerPoint along with the use of English as an instruction language are transformations that demonstrate how lecturers look to practices and solutions of countries with which they have previously cooperated, which means predominantly Western countries.

Recalling the history of the (higher) education system, the influence of foreign universities and foreign countries on Afghanistan's (higher) education system is not a new development. The development of the higher education system from the 1930s onwards was heavily based on foreign funding and expertise. The introduction of modern education in Afghanistan opened the country to foreign influences, but this came with a high price. Universities in particular were breeding spaces for a mixture of ideologies and offered room for students to get politically organised. Some of the students studied abroad, and established valuable connections there. After their return, they were also able to utilise their relations abroad to gain funding for their political activism. Rubin (1995) stresses the importance of the *intelligentsia* which contributed to the radicalisation of the country and its split into leftist and Islamist movements. The resulting political conflicts and the civil war left the country in a vulnerable situation and led to a destruction of the higher education system.

Since the reconstruction and modernisation processes of the post-2001 era, previous established university partnerships have been revived and today foreign donors are funding specific disciplines and universities, like in the 1930s when the universities were established. Within the higher education world, the lecturers have been identified as mediators and translators between the different social worlds, such as the world of foreigners, or the higher education world. Furthermore, it is the lecturers who shape not only their own identity but also that of computer science.

The lecturers have been identified as mediators and translators between the different social worlds, as well as being those who shape their own identity and that of computer science. To examine the role of the lecturers in the reform and modernisation processes, I recall 5.2, where I discussed the role of a lecturer in the higher education system. Additionally, I want to stress another role which the lecturers incorporate, the role of belonging to an academic elite of the country. Their function as role model for a righteous life and being in service for society makes the lecturer's occupation a good starting point for a political career. Mogra (2010:319) states that because of the highly respected role, lecturers are assumed for positions in government. Lecturers confirm that they envisage a political career and often the example of the current president is given; a lecturer at a university, chancellor of a university, minister and now president of the country.

In a country that still has a very high illiteracy rate, a completed university education automatically places one among the upper classes of society. Additionally, Afghanistan society awards reputation, status and a strong social position through accumulated social and cultural capital. This means that a university education and academic rank contributes to their social position. Furthermore, the lecturers can access international networks. Studies abroad strengthen local networks among the lecturers, as well as international networks to other foreign universities, international organisations and agencies or companies. In particular, international actors seek the cooperation of the young generation and educated elite. The lecturers, in their role as mediators, are a

perfect match for the desired 'light-footprint approach'¹⁴ that the international community seeks to implement. In order to avoid a heavier international footprint, the international peace-keeping mission was shaped by concepts and practices of local and Afghan-led approaches. This led inevitably to tensions and contradictions (Suhrke, 2011). While international actors need to stay in control or see only their concepts, approaches and technologies as the *right* approaches, it is difficult to expect Afghan partners to take up 'ownership'.

In particular in computer science, a discipline that is located in the West, it is difficult to localise practices and create ownership of the discipline. Computer science developments are still development projects in the framework of the reconstruction process with a high dependence on foreign funding and technical assistance. The curriculum, teaching methodologies and technologies are all converging to meet international standards. The consequences of this convergence are often incalculable. Education systems in post-conflict countries are often de-contextualised, because international standards are transferred into post-conflict countries without localisation (Rappleye and Paulson, 2007). Such education systems, then, do not deliver desired outcomes such as economic prosperity, for example (Rappleye and Paulson, 2007). The struggles over which knowledge to incorporate into the curriculum and about how to adapt computer science education to the socio-economic demands of the country indicates the difficulties in the establishment of computer science. There are regional differences that influence this development. The security situation and the political control of the region have an impact on the economic situation and job opportunities. Kabul for example, as the capital has plenty of international and national NGOs as well as governmental institutions. This provides different employability possibilities than in the provinces. The more secure and politically stronger regions such as Herat or Balkh can provide better job opportunities. Yet, most Afghans rely on jobs in foreign offices and on foreign funding. If computer

¹⁴ The light international footprint was proposed by Lakhdar Brahimi at the 7th Global Forum on Reinventing Government Building Trust in Government (26-29 June 2007) in Vienna, in his role as Former Special Adviser of the Secretary-General of the United Nations (see also Brahimi, 2007).

science could be Afghan-led, then it would contribute to appropriate and functional technological development in the country. The expertise of computer scientists would be used to create technology that promotes further ownership of technological developments (see also 2.2.3.2).

However, this research also demonstrated that the scientific developments of computer science are not progressing smoothly. The creation of an academic environment is challenging. The implementation of curricula, new teaching methodologies and access to material are changes that take place but are not welcomed by many. It has been shown that students often resist changes and challenge lecturers' positions. To do so, students organised themselves, yet also rely on their social relations and patronage networks, and effectively limited the implementation of changes. Copying homework and cheating in exams are common practice, and this demonstrates the difficulties to implement an academic and scientific culture. The realisation of changes has been difficult and also revealed that expectations of parents, the larger community, administration and foreign experts need to be negotiated by the lecturers on a daily basis.

The situation at the universities also indicates that the role of the lecturers is limited to that of teachers. Scientific marginalisation does not encourage lecturers to fulfil their role as researchers. Moreover, it jeopardises the young lecturers' academic professionalisation. Thereby, external and local actors contribute to this situation. External actors exert a heavy influence with international body of knowledge computer science practices. Local actors yield to the socio-cultural challenges and revert to strengthen their position rather than transform the higher education system towards the goals the MoHE has set. The multiple roles that lecturers incorporate impede a smooth transformation.

Institutionalisation of computer science within the Afghan higher education system took place quickly, but high-quality teaching and research in a scientific atmosphere has not been implemented. Thereby, I would like to highlight the different developments in the institutionalisation of computer science in Afghanistan and the West, for example. In the West, the computer was an object of fascination that brought scientists of different disciplines together, who then created the discipline by negotiation and institutionalised it. In

Afghanistan, the lecturers share this fascination for the computer and the computer also brings them together. Yet the computer has additional meaning to just an object of research. The computer stands for modernity, it opens doors to international networks, contributes to gaining status within society. Further, institutionalisation in the West was pushed because of a demarcation of disciplinary territory. Scientific advancements and research have been made smoother through institutionalisation of the discipline.

In Afghanistan, institutionalisation is pushed heavily within the reconstruction process by international actors. Academic professionalisation follows the institutionalisation of departments, faculties and degree programmes. It is quite the opposite in the West. This complicates the transfer of the discipline, as demonstrated. The lecturers' task is not only to determine what role computer science can have in Afghanistan, at the same time they have to create a discipline and professionalise themselves in being an academic.

7.3 Reflections

The combination of situational analysis and action research has proven very useful for the data gathering as well as analysing. Within the thesis, the approach has been discussed in detail (see 3.3 and Chapter 4). In the following section, I would like to reflect on the choices made and emphasise the experiences and challenges encountered during the research process.

Clarke (2005:265) highlights the flexibility of situational analysis by giving individual and collective perspectives, ideologies and interests a similar weight. In fact, during the thesis, the group of lecturers shared many commonalities, but they are also very different and they splinter and reform into various groups and worlds, depending on the actors present and the conditions of the situation. For example, I mentioned that lecturers collectively and consistently argue for one thing, but they also diverge by ethnicity, gender, age or social position. Discussions about the curriculum, for example, demonstrated that lecturers did not see any problem until they realised that the curriculum needs standardisation, which implies change. Suddenly, lecturers regrouped based on the university they are from, defending their curriculum. Sometimes they

regrouped based on the university where they studied abroad; they diverged into groups of young and old, or they positioned themselves spatially, from Kabul, the city and provinces. Further, lecturers slip into different roles: the role as a lecturer, as an entrepreneur, when they open their own companies, as representatives of their faculty or their country. Situational analysis allows us to follow the lecturers despite these dynamics. At the same time, it offers the possibility to identify the different boundaries that lecturers and other members in the situation constantly draw and redraw.

However, situational analysis was also very helpful in incorporating me into the situation. I also multi-inhabited space and was switching from my role as a lecturer, similar to the other lecturers, to *the* foreign lecturer or to a development worker. Shrum (2005) uses the concept of a Guest of Science when he conducted his own research¹⁵. A guest is a participator but with a transient identity; additionally, a guest revokes expectations. During his research, Shrum (2005) has often been seen as a donor, even though he was not. The role as a guest changes over time and he became friends or professional associates with the other scientists. The relationship between guest and host is a fragile one; it is constantly changing and needs reflection.

While a guest can become a friend, a guest is only there for a short time and he or she is always seen as distinctively different. Shrum (2005) describes guests as 'reagents', given their capacity to take part in or bring about a reaction, not something that is under their control. Aware of my identity as what Shrum (2005) stated as *reagent*, I chose action research. In order to try to understand the developments that apparently go awry, I decided to be a lecturer like all the others but this was difficult to realise. I was, and I will always be, an outsider. While action research aims to co-construct knowledge, it is difficult to realise when identities are so differently perceived. In particular, the international

¹⁵ Shrum's (2005) research project focused on the role of ICT in developing countries and the extent to which ICTs will globalise science. In particular, the relationships between place and identity within science collaboration enabled through ICTs were his focus. He conducted field work in Kenya and Ghana to study scientific networks.

development presence reinforces the divide between expert and local knowledge. I have mentioned in 6.1.2 and 6.1.3 that lecturers sometimes complain that somehow they become lazy or inactive because the environment does not encourage them to be active. At the same time, they are themselves creating the situation. They ask for international support with the idea that internationals are there to give them advice or to have the right strategy plan. At the same time, internationals believe that *their* practices and technologies have to be introduced or replace the ones in place right now. It is a vicious cycle, difficult to break.

For this research, the major challenge was to overcome these seemingly static roles in which everybody is situated. From time to time I was asked to give advice on how developments should take place. However, I wanted to know how lecturers wanted to develop the discipline. An example was the writing of the strategy plan for the faculty. I had been assigned to help out and we did some brainstorming sessions together. However, it was seen as my task to write the strategy plan based on the ideas we had. I tried to involve and give the lecturers the space to write it by themselves. As a foreigner, it was seen that it was easier for me to write the *right* things, the things that foreigners want to hear. The lecturers mentioned that these plans are just to demonstrate that these plans exist, yet nobody is following them and they end up in the drawer (Informal Conversation, 16). So they assigned the responsibility to me. In other situations, it was exactly the opposite. During meetings, the language changed to Dari so I was immediately excluded and I was not informed about the decisions made. This demonstrates the boundary between international and local structures. It presents that I was welcome to help out with specific tasks. In other cases, I was not welcome, or at least it was decided for me that this was not important information.

The many years of working together were crucial in carrying out the research. As mentioned earlier, relationships are built over time, and rapport and trust established. However, during those ten years, I was always associated with Germany and TU Berlin. Thus, an impartial role is difficult to ensure. I mentioned that lecturers group based on where they have studied or donor affiliations, for

example. TU Berlin runs one of the largest master's programmes in computer science for Afghan lecturers. Some of the lecturers receive support, others do not. This research has been conducted independently and not for a project of TU Berlin, but I am aware that I cannot be completely impartial. Lecturers identify me as a staff member of TU Berlin. In some of the interviews, lecturers pointed out the differences compared to TU Berlin's approach. I have observed how lecturers interact with donors and how they act when donors are not present. Being reflexive about these conditions is the only way to overcome them.

7.3.1 Reflections: Action Research

Action research focuses on the co-construction of knowledge, and the daily conversations, faculty meetings, conferences and my visits to other faculties helped in building a shared understanding together with the lecturers. Conferences where lecturers met were interesting places for debate. At the same time, there occurs something that Weingart (2010:8) describes as crucial for discipline development: lecturers talk among themselves. While they argue about which curriculum, for example, is the best, they talk about computer science and concepts, and perspectives converge and diverge. In particular when lecturers have studied abroad together, they form alliances that are not always present but can be revitalised. For example, the computer science faculties at Balkh and Qandahar Universities are just beginning to establish themselves. The deans and lecturers of these faculties studied together and help each other to overcome the challenges. The projects of TU Berlin intervene into the local structure with the broader goals to support the establishment of academic structures, supporting bachelor's education as well as scientific capacity training in computer science. I have been part of this in the larger project programming as well as implementation in the faculties.

During my fieldwork, I was a lecturer at the faculty of computer science at Balkh University. My main tasks were to help out with teaching as well as support the lecturers to improve the situation of the faculty, a rather unspecific goal. When I arrived at Balkh University there were only two official lecturers, and a few candidates who wanted to be lecturers. After I left, the faculty recruited some

of their first graduated class, and were also able to recruit some graduates from Kabul University. Now the faculty consists of thirteen lecturers. This growth in the number of lecturers shows how much change takes place within in a few years.

When I arrived in Balkh, the situation was not unfamiliar, as I worked in other computer science faculties beforehand. Yet, in 2005, when I worked in Herat, there was no computer science faculty or degree programme and the university rented an unfurnished building. Together with the lecturers we built up the faculty. The situation in Balkh was much better. Computer science was a known degree programme, rooms were provided and an IT-Centre was opened recently and provided working space as well as reliable Internet. Although the infrastructure in the faculty in Balkh was much better, than at Herat faculty at its beginning, there were similar problems. Throughout the thesis, I have emphasised on the traditional cultural practice that has been challenged by the lecturers as well as their expectations that are implicitly or more explicitly influenced by international actors. Moreover, I stressed the robust social structure and hierarchy in which the lecturers operate.

The main focus is on the lecturers, they are the persons of change within the classroom. They want to distinguish themselves from bad practices, what they identified as traditional practices such as reading from script and rote-learning in the exams (see 6.2). Feldmann (2000:612, his emphasis) points out that in order to bring change one 'must become discontented with practical theory because she recognizes it as ineffective, unsuccessful, or because it leads to dissonance or dilemmas in practice'. The lecturers want to apply new teaching methods to 'be more effective' (see also 6.2.1), they want to teach students more practical skills and go beyond learning program code by heart. Returning from their postgraduate studies they experienced a new learning environment and a different community of lecturers, which shaped their visions and ideas. They experienced a community where lecturers are allowed to say that they do not know something, where research assistants or associates help out their professors and get trained and prepared for their academic career.

With the main task to improve the situation, we agreed that to begin with we would hold weekly meetings, where we find time to discuss things we want to change and report what we have done. We began with collecting ideas of how we could tackle the rather broad goals. Thereby, the idea of the meetings was to provide more time and space to reflect together with colleagues about our perspectives or beliefs and how we could bring our ideas into realisation. This was to begin with quite difficult, as it meant to reporting and reflecting on our own experiences, challenges and problems, which is not common practice. Additionally, the dean, their superior was also attending, which made it risky to share. The lecturers' fragile social position, which is very much connected with their reputation made it difficult to disclose the problems they experience. In order to make the situation more relaxed, I always started with the problems I had. My long term commitment and experience at other faculties provided me an advantage. The lecturer realised that the problems they faced are not merely personal problems, rather these were problems we all had. Also they saw that I did not face major repercussions by stating my mistakes or my inability to motivate or control the class, though I am outside the local system and not as affected as they are. Yet, not all shared their problems and were still reserved.

We realised that the students were not motivated or interested, at the same time they struggled heavily with the teaching content. They did not prepare nor reinforce the learning contents and they did not do their homework, which all added to the difficulties. The introduction of slides, the usage of English literature created additional discontent among the students. The problems stemmed from the previous semester, where the faculty was running with two recently graduated lecturers. Because of their weak social position they did not fail anyone in the exams to avoid problems, which led to students misusing the situation and assuming that this would continue.

7.3.1.1 One Strategy

One of our ideas was to provide students more perspective about what they study and what they can do with their knowledge to motivate them. The strategy was to run study groups, similar to those at Herat University. While all lecturers were

enthusiastic about offering further service to the students, only I and one other lecturer wanted to actively contribute. The other lecturers did not want to do an extra effort and stated that as well. We printed posters to advertise on the announcement board that we will do a study group about web technologies as well as one about network administration. Moreover, we advertised it for all classes with the idea that students of different classes meet and help each other.

The study groups were welcomed by and popular amongst the students. Because I as a female was present, also the girls arranged afternoon transport and also stayed in the faculty. Most students stayed and even if they were not participating in the study group, they were browsing in the Internet or just chatted with their friends.

The university as a governmental facility already represents a safe space where parents believe their children as safe. In the faculty and in the IT-Centre students could move freely and interact with each other, in particular as all students and lecturers from other faculties left the building. The cleaning and security personnel reacted and notified the university administration, so that we had to seek official permission to use the rooms in the afternoon and inform them that we would supervise the space at all times. The university agreed, as officially lecturers and staff were supposed to work from 8 am to 4pm. There was no excuse not to let us stay in the afternoon. Still, cleaning and security personnel argued at the beginning, as they had to work longer and secondly they were sceptical of what was going on, in particular as girls and boys stayed together. The mixture of gender always was a point to start rumours or even worse, was a potential for blackmailing. The lecturers paid some money to the cleaning personnel so that they let us work without any problem. Also other faculties were suspicious, because there was no obligation to stay longer, and it did not benefit the lecturers per se.

7.3.1.2 Outcome

The study groups were successful, if one looks at the participation rate. It showed that students were interested to learn more, yet when I talked to lecturers and students, it had less influence on student study habits. A series of other small

changes (see below) in combination brought the overall changes that are visible. One outcome was certainly, that students spent more time in the university and dealt directly or indirectly with computers. The strategy also had an impact on lecturers. One lecturer was responsible for the Internet servers and had to stay, because we were working in the IT-Centre. He used his afternoon to stay and used the high speed Internet connection. The other lecturers did not want to take part, yet they did not want to be excluded either. On the one hand, they wanted to make a good impression to me, because I had the connection to the project manager in Berlin and my judgement could have an impact on future projects as well as the lecturers' participation in it. On the other hand, the others did not want to miss out on anything. The lecturers who did not have any other commitments, such as part-time jobs, stayed in the afternoons. To create a friendly and fun time, we arranged lunch together, sometimes watched a movie in the faculty and spent our afternoons together there.

This had a clear impact on the relationship between students and lecturers. The students realised the differences to the other faculties and were very happy that their lecturers stayed extra hours with them. They interacted more casually and students asked questions to the lecturers. This had positive effects, as students experienced their lecturer as a mentor and not as the authoritative figure they are in the classroom. Yet, it also had negative effects, as students misinterpreted the friendliness and thought that this meant that the lecturers would help them in the exam or ignore instances when they did not come to class or did not do their homework. The time the students spent in the afternoons together also had an influence on the class dynamics. Because the study groups were optional, mostly students participated who were interested. Hierarchies and group dynamics in the classroom were quite structured based on gender, city and provincial students, as well as ethnic origin, yet in the afternoon students discovered each other's knowledge and skills and made new friends based on their interests. Of course, student group dynamics did not change radically, nevertheless, they appreciated each other knowledge and interest on occasion, and new friendships developed that might would not have been possible before.

All in all, the atmosphere in the faculty became friendlier, which resulted in students starting to paint the walls, put up pictures, and they created a gallery of the history of computing and created space for themselves. This is in strong contrast with most other faculties. Moreover, students paid part of the redecoration costs themselves. They invited the chancellor of the faculty to show him their efforts. A visit of the chancellor is always an honour for the faculty and particularly for its lecturers. In the official speech the leadership of the faculty as well as the lecturer were publicly appreciated. The chancellor recognised the efforts of the lecturers and they could use this opportunity to present themselves as reliable associates. At the same time, the chancellor remembered the developments and whenever foreign donors were at the university, he directed them to the computer science faculty as an example of the positive developments inside the university.

7.3.1.3 Further Strategies

The introduction of study groups was successful, so that students identified stronger with their studies and being a student. In order to reach the main goal of better quality education, the introduction of study groups was only one of many strategies, which showed only in combination some positive outcome. For example, because students spent their afternoon in the faculty, we as lecturers decided to increase group work within the classes. The students enjoyed working in groups, as it was something new. Yet, as I described also in 6.2.1.2 the giving of homework was not a successful strategy per se. Students copied their homework and did not see it as useful. Our ambition to give feedback was also unsuccessful, as we could not deal with the workload. Additionally, the students' homework was only minimally graded and regulations did not allow any alteration. We could not bring major changes that students would take the homework serious and use it as valuable addition to their learning process at the beginning.

In our weekly discussions, we not only focused on the role of the students and its responsibility, we also pointed out that we as lecturers should be serious about our teaching. This included to be on time and prepared in the class. Often lecturers came late or did not show up at all. The only regulation for lecturers was

to sign the attendance sheet, which he or she could do also anytime during the day. Thus, it needed to be out of the lecturer's goodwill to take his role as a lecturer serious. Because lecturers did not criticise each other openly, it was a topic nobody really touched upon. It was visible that the social position of the lecturer had an influence. While the younger lecturers with weaker social position were always on time, the ones with a stronger social position were more reluctant to be on time. We discussed, to be on time and reinforced with the dean to take more care of it. He was supportive and in our weekly meetings we reported when someone missed the lecturer or came too late. The regular and recurring topic in our meetings made lecturers more aware and sensitive which in most cases led that lecturers came on time.

The major change we implemented was to be strict in and after the exam. This could be implemented because of my presence and we wanted to take the chance to do so. As mentioned, corruption and graft are established practices and are particularly prevalent during exam time. Also, during the exam, students talk and cheat very impudently. An exam committee checks the exams for irregularities, yet the committee never really objects to anything. All lecturers agreed to implement fair examination environment as well as fair marking. We agreed that at least three or more lecturers supervised the exam instead of two. Students were spread more widely, to lower their intention to cheat. We agreed that the exams consists of a variety of question types, which also included questions that not only test for fact reproduction. Further, we agreed that we do not play favours with any student and let them pass. Of course everybody agreed to it, yet none of us complied with it. We could significantly improve the situation during the exam. Students tried to cheat, yet, intense controls made it more difficult and from exam to exam, the situation in the exams improved. Problematic was the marking of the exams. Pressure from all sides are very strong, so that we were not able to be as strict as we wanted to be. Several examples are given throughout Chapter 6, which showed that in order to establish one's position one has to act diplomatically and has to carefully balance what to agree to and where to deny favours. The main strategy was to point out that due to my presence, it was difficult to comply with favours. I was the one to

blame, but because I was outside the local networks, it was more difficult to approach me. Further, many thought that I do not know about or realise the secret arrangements and did not contact me. In some other more severe cases, they approached me and we arranged for compromises, as also I had to negotiate which relations I could benefit from, or which provided me security. Despite some irregularities, we could enforce some kind of fairness and many students have actually failed, who otherwise relied on their cases being solved for them. This strategy worked well, as students felt the consequences when they were not prepared and had not studied. For the following exams, students started to study alone or with friends and took the exams more seriously.

7.3.1.4 Learning Points

The strategies we were implementing were quite small, but what I learned is that change can also be achieved in small adjustments. Moreover, I saw how larger interventions created discontent, as the outputs were not controllable. As already seen, outputs of small adjustments can have larger repercussions.

Adjustments such as the introduction of study groups, introducing more group work, or more practical exercises, painting walls, and being more strict in exams or similar increased the interactions of students and lecturers. Any communication was about negotiating expectations of their role as student or as lecturer, some more conflictive, some positive. But also any changes needed to be communicated with the administration and sometimes with the leadership. Often, interactions were frustrating, when the students complained about too much homework, when any change needed to be discussed with the leadership, when agreed changes were not followed. I realised that also strategies such as the introduction of study groups changes how students and lecturers use the space, it strengthened the identity towards the faculty and the subject, yet it did not change the expectations of students and lecturers towards each other fundamentally. At the same time, adjustments that had direct consequences, such as failing students in the exams, had more impact on students. While students, their parents, and the leadership of the university were quite distressed about these changes, it showed that change is really wanted. The persistence of the

lecturers also educated the new generation of lecturers with these ideals, who also try to implement these ideals to their students now.

The difficulties of implementing changes stem often from the influence of the social position of lecturers. The weekly meetings or the time spent together in the afternoons was quite valuable in creating an atmosphere where social authority is not decisive, where we did not try to dominate each other or where blackmailing would not work. Reducing the socio-cultural limits that lecturers face was one of the aims, which we set for ourselves as lecturers. The long-time of conflicts have created an atmosphere where socio-cultural stereo types are reinforced, where action relies mostly on patronage networks and where security and trust is lacking to challenge these. Distrust is palpable, and many advise: 'Don't trust anybody'. There is distrust in interactions between foreigners and lecturers, between administration and lecturers, between student and lecturers, between the wider community and lecturers. This is recognisable and comes afore through domination, jealousy and can be seen in actions such as denying to sign documents, creating problems, when staying longer in the university or just by threats if students fail.

My presence was to an extent useful in breaking with local hierarchical structures. Yet, also my influence was based on trust between us lecturers. Because of the sensitive relationship between foreigner and locals it was on some occasions also difficult to support or intervene. Action research, through its very collaborative approach and the inclusion of the researcher as a participant, allowed me to gain rapport. Additionally, the long-term commitment of mine is a strength, but it can also be an obstacle. Over the years, I have become used to practices so I have had to remind myself to make the familiar strange, and the strange familiar.

7.3.1.5 Next steps

The implemented changes were mostly focusing on the interactions and relationships between student and lecturer. One major point which has been addressed by the lecturers, but not really addressed in any concrete action is the academic professionalisation of them. They wished for further training and

workshops in order to bring changes more effectively. At the same time, they often claimed that these trainings and workshops are not scientific and not adapted to their capacities or needs. Like their students, they demand more challenges, but in hindsight these create problems. For example, failing in exams during their master's degree programmes created disruption and often meant that lecturers would refrain from working together, disrupting collaboration.

In order to consolidate the change in practises, one important point is to strengthen the lecturers' position, which means to take their wish for further academic professionalisation seriously. Much of the changes stemmed from their commitment, which often was not appreciated. Further initiatives which address to enhance their teaching and research capacity can be useful mechanisms to reward the lecturers' commitment. At the same point, similar to the creation of study groups, further interactions between the lecturers can only be beneficial. Enabling dialog would lead to more constant information and knowledge exchange of the lecturers.

The change in practices already had its effect and the small changes that we implemented have worked overall quite well: after the first semester of field work, one student said in a feedback session, 'This semester I felt the first time as a real student'. Such feedback makes the lecturer very happy.

7.4 Limitations

Every research has its limitations and the personal reflections (see 7.3) have already indicated some of them. I begin with personal limitations and lead then to methodological limitations.

The research focused on the lecturers' perspectives and their interactions in constructing the discipline. Understanding the underlying conditions requires detailed information, thus I have taught in classrooms to understand processes. I could observe the socio-cultural constraints that lecturers face, yet these constraints did not have the same impact on me. The complexity of Afghan society is difficult for an outsider to grasp and analyse. Language barriers restricted my interaction, as my language skills are limited. I consciously decided some years ago not to learn the language. I had problems in the classroom because of my

inadequate communication skills: students and lecturers lost respect for me and the boundaries between private and professional were overstepped. However, the many years of working created trust which I think overcomes in part my language limitations.

With the emphasis on the lecturers as main actors, other actor groups and their perspectives might have been overlooked. Relevant actor groups who interact with the lecturers have been incorporated in the social world analysis. However, of course, lecturers are exposed to many influences and to a variety of individual and collective actors. Other actors' perspectives were not in the focus and were not explored. In 7.5 I point to other perspectives that could be incorporated, for example, the students' perspective, which could enrich the image. There is little literature about micro-interactions within the Afghan higher education system; more studies could explicate the various links and relationships further.

The data chapters draw a detailed picture of life in the computer science faculties and the interactions of lecturers with other worlds. The scarcity of literature on scientific and academic communities in developing countries and about higher education in Afghanistan makes this study a contribution to these fields. At the same time, this scarcity of literature is a limitation and this study would have benefited from being able to draw on more literature.

Recent literature about Afghanistan focuses on the local particularities and the regional differences in the country. Schetter (2013) stresses that a generalisation is difficult to achieve. Regional differences are expressed through different languages and discourses, meaning that it is difficult to gain a general understanding of Afghanistan. Within the thesis, I have abstracted the different computer science faculties. I have pointed out that faculties are different, but I have not explicitly talked about the regional differences and have rather generalised. There are differences between developments happening in Kabul and other provinces. In 6.1.2, lecturers point out the differences between Kabul and their provinces. However, even provincial computer science faculties are located in the major cities and do not reflect the characteristics between rural and urban areas. Nevertheless, I agree with Schetter (2013) that developments

have local particularities, but these were not the focus of this study. They could be followed up in a comparative study of the different faculties, for example.

I will conclude with a more methodological limitation. Social worlds analysis that has been used within the situational analysis framework is quite flexible. This flexibility also makes it difficult to choose what the dominant and influential social worlds are, for example. Social worlds can be small and detailed, yet at the same time large and broad. The ability to zoom in and out in the social worlds seems to make this approach susceptible to a lack of specificity. It is the research question and the continuous findings that make the relevant social worlds visible. Therefore, an abductive research methodology and constant reflection have been carried out to overcome limitations and deliver reproducible and reliable findings.

7.5 Outlook

With this section, I conclude this thesis and recall the anticipated contributions. I stated in the introduction (see 1.6) that this research aims to contribute to further empirical research on the higher education system using a combination of situational analysis and action research, and aims to have a real world contribution.

The data chapters present a '*thick description*' (Geertz, cited in Clarke, 2005:xxiii) of processes and practices in the computer science faculties in Afghanistan. This can contribute to three different kinds of research area. First, it gives a detailed insight into Afghan society and contributes to regional studies but can also be useful for literature in development studies because it is part of the reconstruction process. Second, the case of Afghanistan can be helpful in social studies of computer science, in particular for developing countries as well as higher education studies. Third, the application of situational analysis can provide a framework for researching ongoing processes.

With regard to the first point, the political spotlight on Afghanistan has stimulated more research in recent years. In particular, the setbacks within the intervention tried to ascertain the reasons for the insufficient understanding of Afghan society. Thus, different disciplines picked up different puzzle pieces, to try

to gain a better understanding of Afghan society. This study about computer science lecturers delivers another puzzle piece. It shows the permeable boundaries between socio-cultural practices and scientific practices and the tension it creates for lecturers to mediate between them. Further, the lecturers' identity is shaped by an interplay of different social worlds, which shows the complex situation of today's young generation.

With regards to the second point, already in 7.4, I have mentioned the limited literature on scientific communities in developing countries. Thus, this insight can enrich this account. It needs to be questioned whether the insights into computer science developments in Afghanistan mean something for development in other developing countries. Is it possible to generalise?

The literature review showed that developing countries share specific characteristics such as the lack of qualified lecturers, lack of up-to-date curricula and so on. Little literature engages with academic communities and how lecturers construct the discipline and practices within the discipline. Thus, it would be interesting to explore computer science developments in other developing countries.

Because of the transformational character of ICTs, computer science is still a discipline highly in demand all over the world. Computer science has an overall versatility and a wide range of applications. Yet computer science knowledge remains dominantly in the West. Examining how local demands can be tackled with the still very 'Western' international discipline remains necessary. How computer science education, in particular, is positioned between these two extremes of local demands and international scientific standards is an intriguing question. In countries where computer science education has existed for several years, the role of innovation is important. The link between computer science education and its transition to real world application is crucial to understand. Seen in the example of Afghanistan, the private sector plays a significant role, and the role computer science education plays needs further investigation. How computer scientists professionalise themselves and how academia and the private sector shape the understanding of computer science is interesting. This research shows that the particular local context of countries plays a significant

role. Further detailed studies in other countries can give further insight into the relationships.

In regard to the third point, the combination of situational analysis and action research has been quite useful in examining ongoing processes. Action research allowed the planning and implementation of strategies. Through setbacks and successes, action research helped to refine our understanding of the situation in a collaborative manner. The main goal is to support computer science education and develop local capacity, because computer science can have a big impact on innovation and technology. It is necessary to understand how scientific capacity can be activated so that it can lead to social change. One of the main findings was the constant scientific marginalisation within the higher education system. Results of this research can feed back into policy and strategy design to support localisation of computer science, as well as support the academic professionalisation of computer science lecturers. The tension between institutionalisation processes, which are informed by international bodies of public and private institutions, and the lecturers' capacity to create their own vision of computer science within the Afghan higher education system has been pointed out. In particular, lecturers who do not have any role models in their faculties feel isolated with the task and fall back into old patterns to strengthen their social position. The lack of academic professionalisation is unfortunate, in particular because all actors would actively like to change this.

Serious commitment from all actors is necessary. In particular, international actors could use their resources to strengthen computer scientists' scientific networks through information and knowledge exchange. Taking the lecturers seriously, demanding scientific activity and performance while at the same time providing them with sufficient support on their scientific journey needs to take place. The socio-cultural constraints are strong and difficult to overcome without frustration but international actors, who are only there for a short time, should utilise their resources and power and show real commitment. Often trips and training are political and strategic projects to ensure support or to maintain influence or patronage networks.

One of the key points, I mentioned previously in 7.3.1, will be the academic professionalisation of the lecturers. Together with the lecturers we talked about how to support their scientific capacity training. We talked and thought about seminar series and summer schools that can help them to develop and professionalise themselves. Enhancing research and teaching capacity are goals of the MoHE's strategy plan. In particular, didactics and research methodologies as well as current hot topics in computer science are areas for which the lecturers desire support. An often-stated wish was the creation of academic and scientific networks for computer science lecturers at governmental universities to bundle expertise and foster collaboration between the universities. Stimulating discussion about scientific topics among the lecturers is a starting point for discipline formation. Moreover, enhancing scientific capacity might overcome some of the socio-cultural constraints. Computer science knowledge is seen as neutral and less controversial. Struggles of authority occur rather in the political arena and concern who speaks when, who participates where, or who can decide what, but there are fewer struggles about specific computer science topics. Thus, focusing on scientific training, might lose sight of socio-cultural or political struggles. Further, it would enhance and give value to scientific competence, which is constantly marginalised.

But it is not only socio-cultural constraints that must be overcome. The future of computer science development depends on the political situation as well the security situation. The future of Afghanistan is difficult to anticipate. There are many dependencies and conditions to consider. The future strategies of the international community are similarly unclear, like the consequences and effects that international involvement has. The pertinacity of students and lecturers can be observed in their continuous and increasing engagement and activities. They believe that technology can bring social change and work to contribute so that their society changes. Students, as well as lecturers, start to organise themselves. Such enthusiasm needs support, but it also requires time.

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9 Appendix

9.1 List of Interviews and Informal Conversations

Identifier	Date	Location	Description
Interview 1	01/06/2011	Kabul/Afg.	Interview with Lecturer
Informal Conversation 2	03/10/2012	Mazar/Afg.	Informal Conversation with Lecturer
Informal Conversation 3	04/10/2012	Mazar/Afg.	Informal Conversation with Lecturer
Informal Conversation 4	09/10/2012	Mazar/Afg.	Informal Conversation with Lecturer
Informal Conversation 6	16/10/2012	Mazar/Afg.	Informal Conversation with Lecturer
Informal Conversation 9	18/10/2012	Mazar/Afg.	Informal Conversation with Lecturer
Informal Conversation 10	20/10/2012	Mazar/Afg.	Informal Conversation with Lecturer
Informal Conversation 11	23/10/2012	Mazar/Afg.	Informal Conversation with Lecturer
Informal Conversation 13	23/10/2012	Mazar/Afg.	Informal Conversation with Lecturer
Informal Conversation 14	24/10/2012	Mazar/Afg.	Informal Conversation with Lecturer
Informal Conversation 16	10/11/2012	Mazar/Afg.	Informal Conversation with Lecturer
Informal Conversation 18	20/11/2012	Mazar/Afg.	Informal Conversation with Lecturer
Informal Conversation 19	25/11/2012	Herat/Afg.	Informal Conversation with Lecturer
Informal Conversation 20	25/11/2012	Herat/Afg.	Informal Conversation with Lecturer
Informal Conversation 21	25/11/2012	Herat/Afg.	Informal Conversation with Lecturer
Informal Conversation 22	25/11/2012	Herat/Afg.	Informal Conversation with Lecturer
Informal Conversation 23	25/11/2012	Herat/Afg.	Informal Conversation with Lecturer
Informal Conversation 24	26/11/2012	Herat/Afg.	Informal Conversation with Lecturer
Informal Conversation 25	02/12/2012	Mazar/Afg.	Informal Conversation with Lecturer

Identifier ▼	Date ▼	Location ▼	Description ▼
Informal Conversation 27	02/12/2012	Mazar/Afg.	Informal Conversation with Lecturer
Informal Conversation 29	12/12/2012	Mazar/Afg.	Informal Conversation with Lecturer
Interview 30	20/12/2012	Kabul/Afg.	Interview with Lecturers
Informal Conversation 32	21/12/2012	Kabul/Afg.	Informal Conversation with Lecturer
Interview 33	22/12/2012	Kabul/Afg.	Interview with Lecturer
Interview 35	22/12/2012	Kabul/Afg.	Interview with Lecturer
Informal Conversation 37	25/12/2012	Kabul/Afg.	Informal Conversation with Lecturer
Interview 38	26/12/2012	Kabul/Afg.	Interview with Lecturer
Informal Conversation 40	15/04/2013	Mazar/Afg.	Informal Conversation with Lecturer
Informal Conversation 41	24/04/2013	Mazar/Afg.	Informal Conversation with Lecturer
Informal Conversation 42	20/05/2013	Mazar/Afg.	Informal Conversation with Lecturer
Informal Conversation 43	26/05/2013	Mazar/Afg.	Informal Conversation with Lecturer
Informal Conversation 44	30/05/2013	Mazar/Afg.	Informal Conversation with Lecturer
Informal Conversation 45	03/06/2013	Mazar/Afg.	Informal Conversation with Lecturer
Interview 46	12/06/2013	Kabul/Afg.	Interview with Lecturer
Interview 47	12/06/2013	Kabul/Afg.	Interview with Lecturer
Interview 48	12/06/2013	Kabul/Afg.	Interview with Lecturer
Interview 49	13/06/2013	Kabul/Afg.	Interview with Lecturer
Interview 50	13/06/2013	Kabul/Afg.	Interview with Lecturer
Interview 51	13/06/2013	Kabul/Afg.	Interview with Lecturer
Interview 52	13/06/2013	Kabul/Afg.	Interview with Lecturer
Interview 53	13/06/2013	Kabul/Afg.	Interview with Lecturer
Interview 54	14/06/2013	Kabul/Afg.	Interview with Lecturer
Interview 55	14/06/2013	Kabul/Afg.	Interview with Lecturer
Interview 56	14/06/2013	Kabul/Afg.	Interview with Lecturer
Interview 57	14/06/2013	Kabul/Afg.	Interview with Lecturer
Informal Conversation 58	15/06/2013	Kabul/Afg.	Informal Conversation with Lecturer
Interview 59	15/06/2013	Kabul/Afg.	Interview with Lecturer
Informal Conversation 60	15/06/2013	Kabul/Afg.	Informal Conversation with Lecturer

Identifier ▼	Date ▼	Location ▼	Description ▼
Interview 61	23/09/2013	Berlin/Ger.	Interview with two lecturers
Informal Conversation 62	23/09/2013	Berlin/Ger.	Informal Conversation with Lecturer
Informal Conversation 63	09/05/2013	Mazar/Afg.	Informal Conversation with Lecturer
Informal Conversation 64	23/09/2013	Berlin/Ger.	Informal Conversation with Lecturer
Informal Conversation 65	09/09/2014	Berlin/Ger.	Informal Conversation with Lecturer
Informal Conversation 66	23/12/2013	Kabul/Afg.	Informal Conversation with Lecturer
Informal Conversation 67	23/12/2013	Kabul/Afg.	Informal Conversation with Lecturer
Informal Conversation 68	10/01/2015	Edinburgh	Mobilephone Conversation with Lecturer

9.2 Situational Analysis Mappings

The following presents different maps from situational analysis.

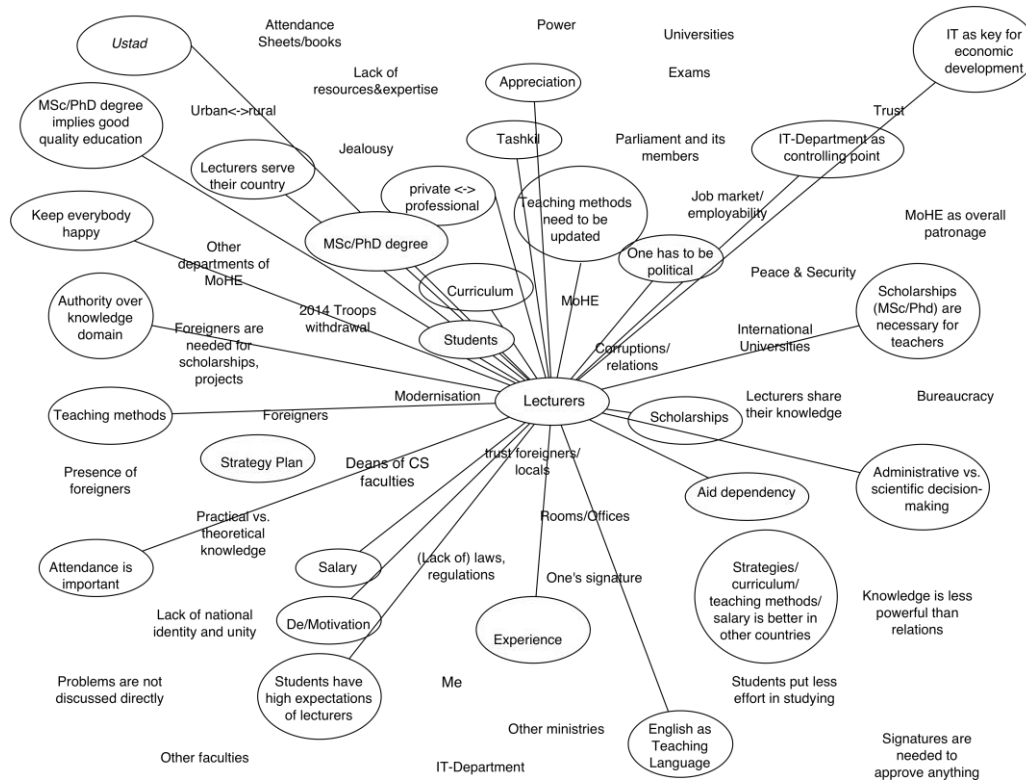
9.2.1 Messy Situational Map



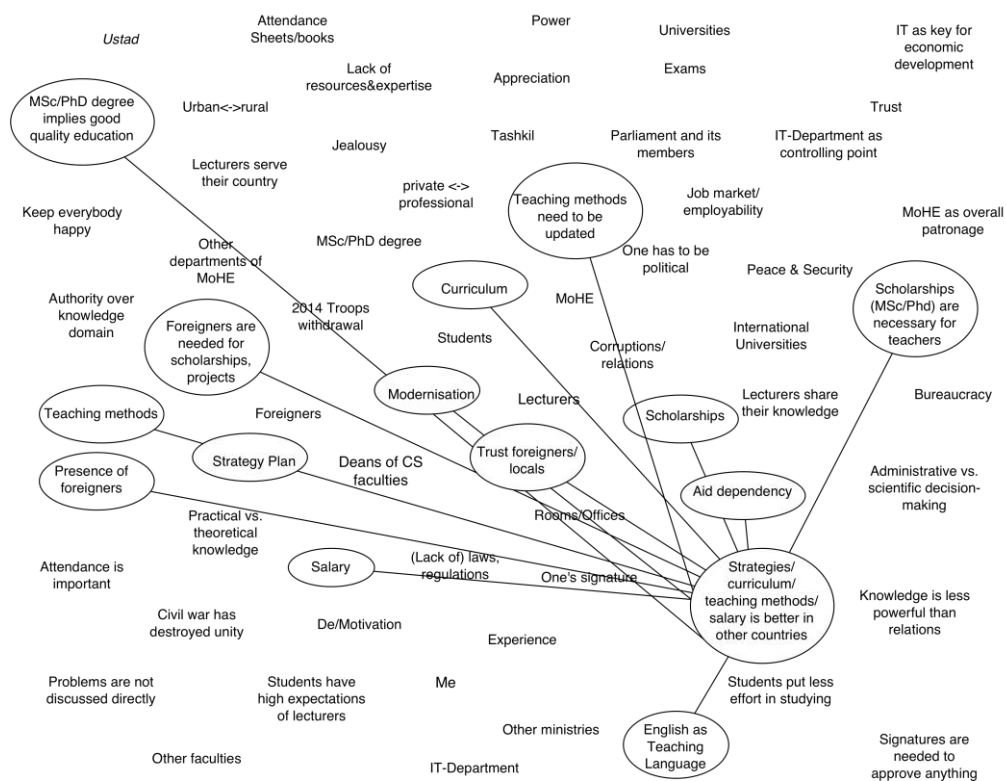
9.2.2 Abstract Ordered Situational Map

<p>INDIVIDUAL HUMAN ELEMENTS/ACTORS Lecturers Deans of computer science faculties Me</p> <p>COLLECTIVE HUMAN ELEMENTS/ACTORS University MoHE IT-Department Other faculties Foreigners International Universities</p> <p>DISCURSIVE CONSTRUCTION OF INDIVIDUAL AND/OR COLLECTIVE HUMAN ACTORS Lecturers serve their country Lecturers share their knowledge IT-Department as controlling point MoHE as overall patronage Foreigners are needed for scholarships, projects Students have high expectations of lecturers Students put less effort in studying One has to be political</p> <p>POLITICAL/ECONOMIC ELEMENTS IT as key for economic development (Lack of) laws, regulations Corruption/relations Job market/employability Bureaucracy Lack of national identity and unity</p> <p>TEMPORAL ELEMENTS Peace & Security Lack of resources and expertise 2014 Troops withdrawal</p> <p>DEVELOPMENTAL ELEMENTS Aid Dependency Presence of foreigners Trust foreigners/locals Modernisation</p> <p>MAJOR ISSUES/DEBATE Jealousy Trust Power De/Motivation</p>	<p>NON HUMAN ELEMENTS/ACTANTS Strategy plan Tashkil Attendance sheets/books Exams Curriculum Teaching methods Scholarships Salary MSc/PhD degree One's signature</p> <p>IMPLICATED/SILENT ACTORS/ACTANTS Students Other departments of the MoHE Other ministries Parliament and its members</p> <p>DISCURSIVE CONSTRUCTION OF NONHUMAN ACTANTS MSc/PhD degree implies good quality education Scholarship (MSc/PhD) are necessary for teachers Teaching methods need to be updated Strategies/Curriculum/Teaching methods/Salary is better in other countries Attendance is important Signatures are needed to approve anything</p> <p>SOCIOCULTURAL/SYMBOLIC ELEMENTS <i>Ustad</i> Knowledge is less powerful than relations Problems are not discussed directly Keep everybody happy</p> <p>SPATIAL ELEMENTS Rooms/Offices Urban and rural Private vs. professional</p> <p>ACADEMIC ELEMENTS Administrative vs. scientific decision-making Experience Appreciation Authority over knowledge domain English as teaching language Practical vs. theoretical knowledge.</p>
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9.2.3 Relational Analysis

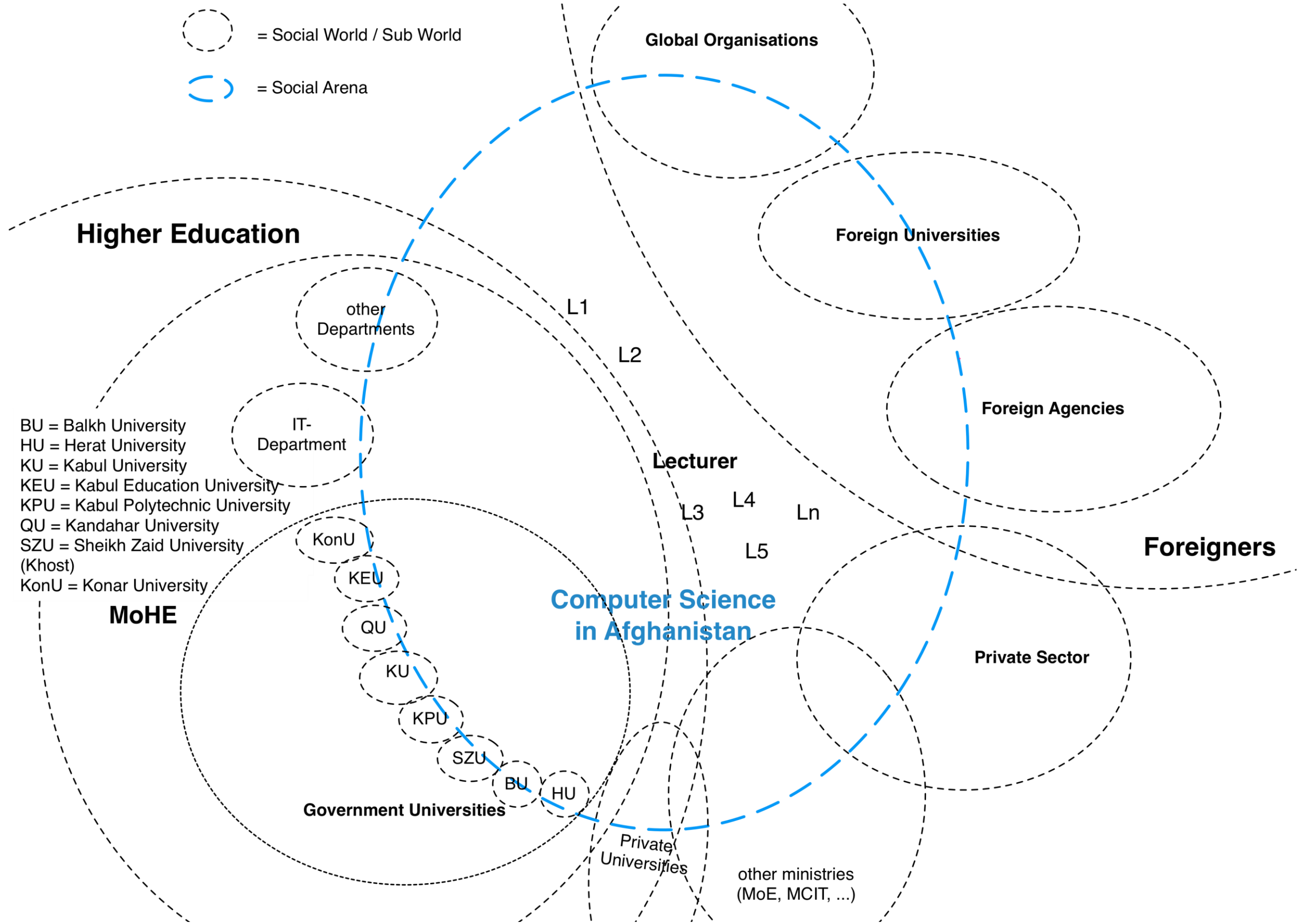


Relational map: focus on lecturers

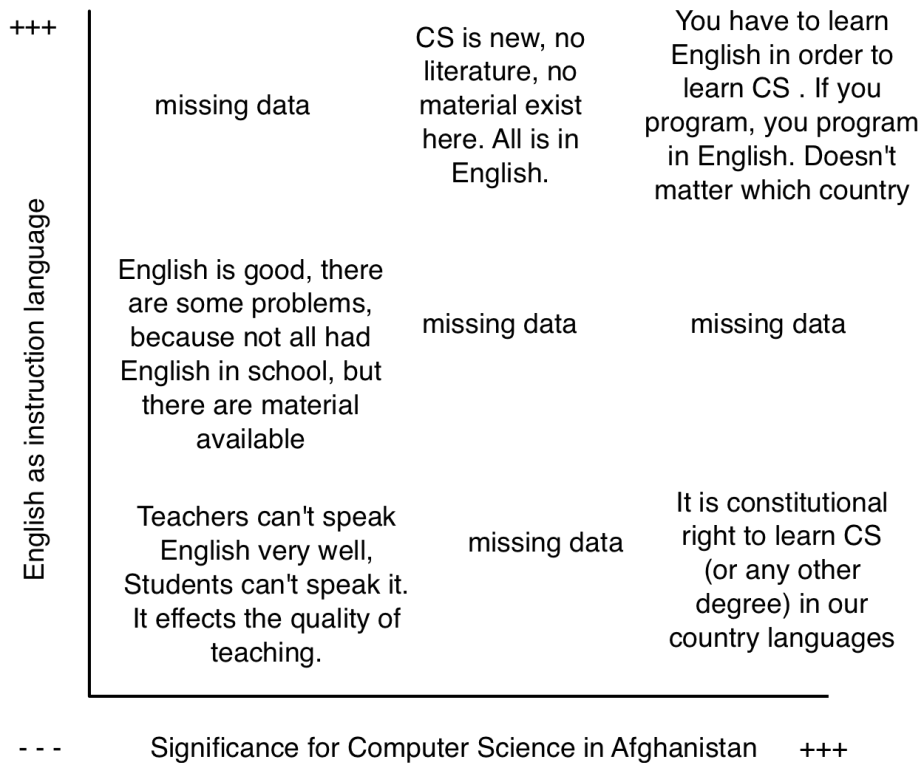


Relational map: focus on strategies/curriculum/teaching methods/salary is better in other countries

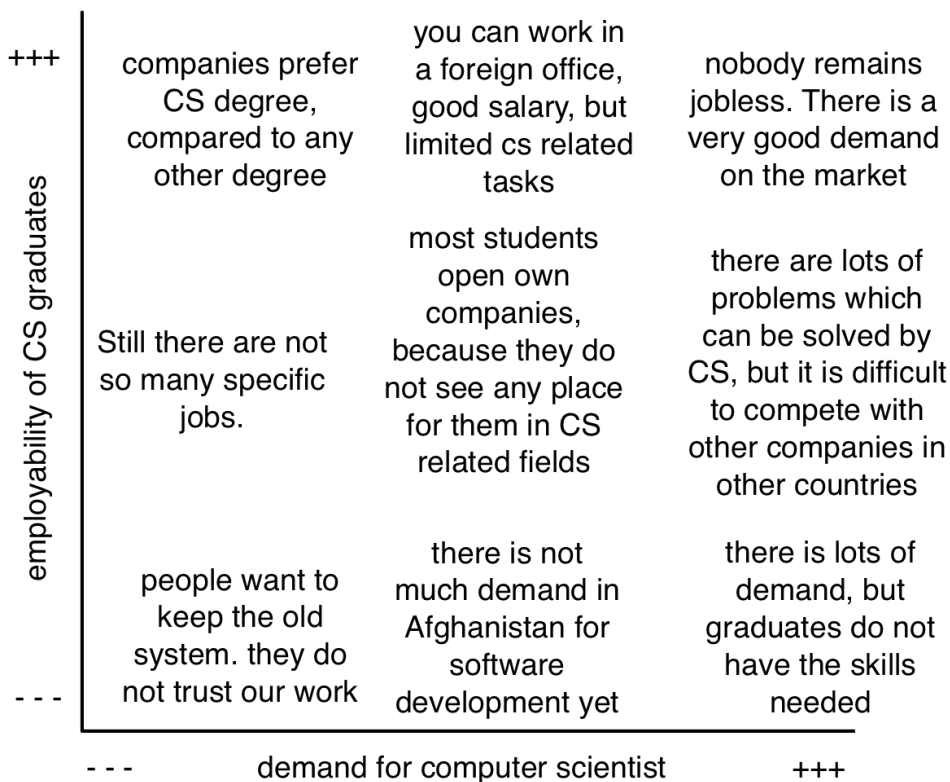
9.2.4 Social World Arena Map



9.2.5 Positional Maps



Positional map: significance of English as instruction language in computer science



Positional map: demand and employability of computer scientists